The Builder.

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*Breweries.**

THIS is now 236 years ago that the first patent was taken out to secure the advantages accruing to a contrivance for an improved mode of brewing. Sea-coal had just begun to come into use, and the improvement consisted of its adoption and the manner of its adoption. We read in the lists of patents, against the date 1635, July 23,—"Nicholas Halse. Making kilns for drying malts and hops with sea-coal turf or other fuel, without touching smoke; capable also of being used for cooking, drying, and starching at one time with one fire, and thereby lessening the consumption of wood and straw." In the following year Sir W. Bromicker took out a patent for drawing double the quantity of *aqua vitæ* from a given quantity of liquor and more strong water from malt than had been done. A year afterwards, Thomas, Earl of Berks, patented a kiln for drying malt, grain, and hops. It was a time when country gentlemen and their dames took great delight in what were called "country contentments." The days of the old flockings to the king's standard, to march against France or Scotland, were over the possession of town houses was the happiness only of those attached to the State or the Court: hence the worthies of those days seem to have made their own homes into centres of interest. The contemporary works of Gervase Markham show precisely the attention paid to the great household matters of banquets, brewing, baking, dairy operations, and so forth, by the families of wealthy country squires of the seventeenth century; but as customs changed, and the London season gradually became more and more engrossing, those arts were left to persons who made them their sources of livelihood. Following the fortunes of brewing only, for the present, we may see, that since those homely days 600 persons have taken out patents connected with its perfection. Moreover, carrying out still further the principle of division of labour, the structural arrangement of a brewery is now considered the province of engineers whose experience has been specially concentrated upon the subject.

A "brewers' consulting engineer and architect," Mr. Scamell, has just completed a volume pertaining to this special class of experience. In it, he not only unfolds the general principles that should be carried out in the erection of a brewery, and instructs in such important details as sites, wells, engines, and other machinery; but he dilates upon every detail; and then supplements his instructions with twenty plans. To this information he has appended a list of the large number of patents just mentioned, which, in its way, is a veritable beacon.

Looking into Mr. Scamell's book, the conviction comes to us that he has really been at great pains to master his subject. In the matter of wells, for instance, he might have been content with the old method of lining them with bricks, with or without rings of cement or concrete; but, we perceive, he has given the newest use of iron cylinders. A deep well sunk at the Albion Brewery, Mile-end, through a highly diversified section, was thus lined with tubular iron with complete success, we may state, a few years ago; and any work not recording the method would not be up to the mark. And so on, throughout. He by no means intends, however, that his work should supersede the services of the architect or engineer, and frankly states that it would only mislead to recommend any particular arrangement without a knowledge of the circumstances and place where they were to be made; consequently, he deals in generalities. But out of these generalities it is pretty easy for any one thinking over the project of building a brewery to ascertain the main points to insure a successful issue to the undertaking.

A model brewery should be built upon a gentle slope, far away from gasworks, or other ill-smelling manufactory, but near a river, canal, or railway, so as to admit of an inexpensive supply, as well as distribution of its products; for this gentle slope will admit of the principle of gravitation being applied to the brewings, and thus save pumping. It should have a good water supply; and borings should be made to ascertain the presence of this indispensable article, before any other outlay is determined upon. The foundations of the building should be laid with concrete; except in extraordinary cases, when special treatment would be required. The tun-room should face the north, and be tiled. All floors should be fire-proof; and they should be laid with asphalte or concrete, because these materials can be swept cleaner than bricks or stones with chinks between them. The rain-water should be collected from the roofs and stored, either for brewing, or for the horses, or for other purposes. With regard to the wells, although Mr. Scamell, as we have seen, gives his readers choice of brick and iron lining, there is something to be said for concrete:—

> "In place of lining the excavation of wells with bricks, Portland cement concrete is now being used with great success. The operation is very easily carried out in soils of ordinary tenacity and firmness, greater difficulty being of course met with in the case of loose soil or running sand. Where the well is of no great depth, and the soil firm, so that an excavation can be made at once, a drum is made, the external diameter of which is equal to the internal diameter of the well, the excavation being made so much greater in diameter than the drum, as the thickness of the concrete and lining of the well is intended to be; 9 in. is a thickness which will do in ordinary soil. The space then left behind the internal diameter of the excavation, and the external diameter of the drum is filled or packed in with the concrete, the depth of which packing is, of course, equal to the depth of the drum, which may be 18 in. or 2 ft.; the level of top of packing flush with the top of drum. The drum is then raised, and supported by uprights and braces when another packing of concrete is made, when the drum is again raised, and so on till the whole depth of excavation is lined with concrete. The bottom of the excavation should be lined with a layer of concrete 9 in. thick, and the top may be arched over, leaving a man-hole door in the centre, and a bore for the pump-barrel to pass down. If the soil is not very sound, a drum had better be sunk from the top, filling in the concrete from the top, then excavating below the drum, and lowering this, and then filling in the concrete lining."

Nothing could be more explicit than this, if the brewer-elect could only decide which material would suit his particular well best. But for this information he must still resort to the engineer in person. In the case of the well in the Albion Brewery, to which we have alluded, it may be useful to state, that the metal cylinder is surmounted with 96 ft. of brickwork lining, and below the cylinder there is a boring 156 ft. deep into the chalk. The total depth is 357 ft. It was commenced in November, 1858, and finished by July, 1860. The strata were found to be curiously diversified. After removing a top dressing 10 ft. deep of made ground, there came 10 ft. of gravel, then a layer of blue clay 5 ft. deep, with one of boulder-stone below it of 1 ft. before the great bed of London clay was reached. This was 50 ft. thick. Below this was a thin layer of wood and metal. Then came 6 ft. of sand and loam, with a sandy clay bed 21 ft. deep beneath it. Pebbles, shell-rock, mottled clay, sand and water, brown and blue clay, blue clay unmixed, then a depth of 1 ft. of wood, followed. Shells and metal, silting-sand, oyster-shells, next told of further old seas. Then there were loam and sand, mottled clay, green sand, the same with pebbles, the same with clay, flint pebbles sand, flint, stones, and at last the chalk. The metal cylinder served for all below the first depth of 96 ft.

To return to the model brewery. It should have its vast rain-water tanks lined with Portland cement; and it would be as well to have these tanks of a circular form. Mr. Lowe has furnished a table showing the number of gallons contained in circular tanks of different diameters, and the number of bricks required to line them, which will facilitate the needful calculations. It should have either a vertical or horizontal high-pressure engine, with a single slide valve, governor, &c.; unless, indeed, it is to be a very large concern, when the engine should be fitted with an expansion slide regulated by the governor or by hand. Its boiler must be of ample dimensions; but it may be of the form known as the Cornish boiler, with an internal tube, or that known as the Lancashire, with two internal flues; and either of them should be placed in a separate building, detached or semi-detached from the brewery. The pump that supplies the boiler should have a "pet-cock" on the conducting pipe from it, so that it may be readily ascertained whether the water is actually passing freely into the boiler, or whether the valves are sticking, or the piston fitting so loosely that it draws air; or, better still, a "Giffard's Injector" should be procured. This contrivance, Mr. Scamell urges, is almost entirely free from the ills pumps are heirs to, and "that it works with so small a pressure of steam on the boiler that it may be said to be practically independent of the working of the steam on the engine." But it has its drawbacks, nevertheless, for it will not work when water is used at a high rate of temperature, nor will it draw water from a greater depth than 6 ft.; consequently, a third contrivance, "the donkey engine," may be preferred to this clever injector, which is, doubtless, well known to most of our readers as being in pretty general use. The claims of the donkey engine are thus introduced:—

> "Recently, however, several firms have introduced forms of donkey-engines, which, for simplicity of construction, and from the ease with which they are set at and maintained at work, and also from the ease with which they are repaired, are nearly all that can be desired for supplying boilers with water. They are capable of pumping boiling water from the full practicable depth or distance. They can be set to work, also, with a pressure of steam in the boiler as low as 15 lb. to the square inch; and, by merely giving a larger cylinder, or using the next size to that required to do certain work, as low a pressure as 10 lb. steam can be used. They work freely at a rate of 150 revolutions per minute, although we have seen them work at a higher rate than this, delivering the water to the boiler with the greatest precision."

Next come contrivances to ascertain whether the water-supply is deficient or over-abundant, such as water-gauges, gauge-clocks, and floats. Of these the water-glass gauge is the best, and two of them should be provided, and kept clear and bright. In like manner two safety-valves should be provided, and one of them should have a lock-up weight, as an extra precaution against carelessness. There should also be a scum-pipe to remove the incrustations to which the interiors of boilers are liable. This contrivance has been only recently adopted for land boilers, and it is admirable.

In the matter of machinery: a model brewery should be provided with duplicates of the principal wheels; a good supply of wooden cogs

* "Breweries and Maltings: their Arrangement, Construction, and Machinery." By George Scamell, A.R.I.B.A. A. Fullarton & Company, London and Edinburgh. 1871.

and an extra pair of malt-rolls. For the sake of tightness, Mr. Scamell recommends that the shafting should be turned all over; except, perhaps, in dark or out-of-sight places, where it may be left "black," or unturned. "The shafts," he continues, "are best retained in their places by means of collars fitted on the shafts, so as to work against the sides of the brass in plummer blocks, and secured in their places by screws, bolts, and nuts." The malt-mill arrangement to be preferred is the adoption of a double screen, one fine and one coarse; and a good malt measurer should not be forgotten. The "Jacob's ladder," or elevator, by which the malt or grist is raised, should be cased in cast-iron. The head of it should be fitted with brasses for the spindle of the top pulley to work in; and the lower end, with brasses and adjusting screws, for the leather strap. Tin or light galvanised iron buckets may be used. Iron mash-tuns, cased with felt, are commended, but not insisted upon, as some brewers entertain fears that iron acts injuriously upon the wort; but whether of wood or iron, it is desirable to have a door at the bottom of each tun for the removal of the grain. For a mashing-machine, there is a choice between an internal and an external arrangement, with a recommendation to have both, as an internal machine can manage a stiffer mash than one of external application. The hoisting tackle is best worked by hydraulic power; but when this is not to be had, it must be worked by friction. Grist cases should be made of well-seasoned deal, ploughed and tongued. Hoppers if made of iron, should be lined with deal.

It does not appear to be quite settled yet whether beer is better when the wort is boiled by fire or steam, in open or close vessels, or by coils or "steam jackets." While this question is pending it would be, perhaps, unwise to make an arbitrary selection of either system for our model establishment; but we may mention that Mr. Scamell says he has been called upon to substitute an open copper with a steam jacket for a copper, which experiment was attended with excellent results.

Everywhere, we perceive, the brewers' consulting engineer has to contend with this diversity of opinion upon the proper conduct of the various processes entertained by brewers. If the brewers could come to one consistent system of brewing, the arrangement of a model brewery would be much simplified. But their contending opinions lead to indecision and doubt. Some brewers, for instance, consider the once indispensable coolers quite unnecessary and even hurtful to the wort. To these, Mr. Scamell would recommend a powerful refrigerator. But for the brewer of the old school a model establishment should have coolers of sufficient amplitude to contain the whole gyle, so arranged as "to allow the wort to flow over the first cooler, and back over a second." Then again, the technical opinion of the brewer must be consulted as to the material. The engineer would recommend that great source of most of his power, iron. But there are some brewers who will stand out for bright shining copper; whilst others will have wood, as being least liable to affect the brew either one way or the other. Deferentially, Mr. Scamell gives way, and will let them choose: provided they refrain from coolers lined with tiles, which he abhors, because the numerous joints prevent them from being kept sweet. An ice-making machine should be in every brewery of any pretensions. The newest agent employed in these is ammonia, and the old plan of evaporation of ether is laid by. The fermenting tuns, under ordinary circumstances, should be made of yellow Dantzic planks and square: aiming at perfection, however, they should be slate. But if the brewer should have Yorkshire sympathies, and think no ale like the Yorkshire ales, his tuns must be made of stone slabs:—

"The practice of fitting heads to fermenting-tuns appears to have gone out entirely, as, during the last thirteen years, we do not know of a single instance in which they have been adopted, while, on the other hand, several old tuns have had the heads removed under our superintendence. Where circular wood tuns are employed, the simplest and best way is to allow the staves to run up, so as to form the yeast-boarding, having a man-hole cut in front, fitted with sliding-doors. And in square tuns, although the expense may be a trifle greater, by far the best plan is to construct the tuns of sufficient depth, allowing for the yeast, having a man-hole cut in front, as before mentioned. . . . For brewing porter or stout, the tuns may be of any size, containing in some instances, in some of the London breweries, from 1,500 to 1,800 barrels. For ale, however, the size of the tun should be limited, from 60 to 120 barrels being a good size."

Another practice that appears to have gone out entirely is vatting. The vats in a brewery used to be one of its lions; but now it is doubtful whether any need be erected in a model building. Should, however, it be settled to use them, they should be made of English oak, and placed on iron columns and framing high above the electrical currents on the face of the earth that are so disastrous to the quality of beer.

For wort mains, tinned copper pipe should be used, in convenient lengths, with unions, and at a fall of not less than 1 in. in 10 ft. For water and steam pipes, cast or wrought iron may be used. Pipes that cannot drain themselves, such as stand-pipes, should have draining-cocks. Gun metal should be used for all cocks and valves. Waste-pipes should be made to discharge into an open cistern, and not into a drain.

The hop-presses should be worked by hydraulic power. Mr. Scamell recommends the kind invented by Mr. King, consisting of two endless chains placed either vertically or horizontally, set, not parallel with each other, but at an angle, which press the wet hops, and throw them out into a receptacle prepared for them. A yeast-press is another requisite. The best is that in which the liquor is forced into bags, by means of a force-pump regulated by a safety-valve attached to it. There are several kinds, and one of the simplest, according to the writer whose recommendations we are tracing out, is that patented by Mr. Waller, in which the needful pressure is obtained by the force of water acting upon an india-rubber bag, or by allowing the beer to fall from a sufficient height.

A more considerable item is the malting. The best arrangement for this is one working floor, with the couch and cistern at one end, and the kiln at the other. Over it could be the barley and malt stores. But if space should not permit this easy working plan, and two floors must be adopted, place the cistern midway between them. Here, both in couch and cistern, the excise regulations insist upon certain dimensions, and a good light for the sake of the excise-officer when gauging. The kiln should have a perforated tiled floor, from 12 ft. to 18 ft. above the firing-place; and it should be provided with a cowl in preference to a fixed ventilator.

And, now, what is the cost of such a model brewery? Mr. Scamell gives several estimates. A "five-quarter brewery," delineated with "cast-iron cold-water tank, wooden hot-water back, malt-rolls, with hopper and flat screen, grist case, self-acting mashing-machine, mash-tun, with sparger and cast-iron false bottom; steam-boiling wort-copper, wood hop-back, with cast-iron false bottom, refrigerator, four fermenting tuns, cleansing casks and stillion, Cornish boiler and engine, with two sets of three-throw pumps, driving gear, all pipes and cocks, and well, not exceeding 30 ft. deep," would cost about 2,200*l*. A twenty-four-quarter brewery would cost about 7,700*l*. As the scale is enlarged so is the well deepened, and the appliances increased in number as well as extent. A "hundred-quarter brewery," with plant, but without a tun-room, would cost about 9,600*l*. And a brewery, illustrated, intended for four fifty-quarter mash-tuns, with the best fittings, an Archimedean screw, hydraulic hoppers, and similar perfections, is estimated as likely to cost 12,000*l*., without the tun-room.

When we close Mr. Scamell's book, we seem to have passed through a well-appointed brewery; and it is hard to believe there is not an odour of grain in the air, nor a difficulty in getting out of the way of dray-horses. We feel, despite the differences in the modes of brewers, that any one about to build or remodel an establishment of the kind, would do well to give it perusal, before even he looks out the site, or the direction in which an addition to it should be made, for the chances are he will find many a hint and recommendation in it that will prove useful. Architects to whom the class of work is new, would increase their general information, at a small cost, by looking into it, and placing it upon their shelves for reference. We should add that the author was for some years in the engineering department of the well-known establishment of Messrs. Truman, Hanbury, Buxton, & Co.

Fall of a Chapel Gallery.—On Sunday evening, the gallery in the United Methodist chapel, at Troon, Camborne, gave way soon after the commencement of the sermon, and fell to the ground. The gallery itself was moderately well filled, but fortunately there were few persons sitting under it at the time, and they escaped with a few bruises.

IMPRESSIONS OF BRISTOL AND CLIFTON.

BY A VISITOR FOR THE FIRST TIME.

A congeries of streets, intersecting at all possible angles but a "right" one, and with every variety of gradient, from 1° to 45°,—streets too narrow in many places for the traffic, and where every one seems to be in the way of somebody else; much mud; rows of dingy-looking houses and shops, between which creeps sluggishly a dirty brown river, looking, with its walled banks and rows of heterogeneous shipping, more like an elongated and irregular dock than a stream;—such is the general impression conveyed in driving from the bare and uninviting railway-station into the city of Bristol, properly so called, the lower town, where the commerce of the place is carried on, in no slack or indolent manner. The business part of the town, in fact, reminds one more than anything else of the less-attractive commercial quarters of the city of London, which are still unembellished by palatial-looking offices and chambers; and the visitor requires a more detailed investigation to correct his first impressions, and to discover that Bristol contains, scattered about, more objects of architectural interest than he would suspect at first sight. Foremost among these, of course, are the two well-known churches, the Cathedral and St. Mary Redcliff.

The special work now being undertaken at the Cathedral, readers of the *Builder* need not be reminded, is the adding of a new nave to the existing choir and transepts, under the direction of Mr. G. E. Street. It had been intended to build two bays of the nave completely, before proceeding with the rest; but this intention has been abandoned; and, while the two eastern bays are now completed, so far as the masonry is concerned, the whole of the rest, westwards, is already carried up to a considerable height from the ground. The nave will, however, be a comparatively short one, as the available ground is limited in extent westward. In the new work, the main design of the choir, with its three aisles of equal height, and its remarkable internal horizontal flying buttresses across the side aisles, is being repeated, the material used being the Doulting stone, a hard, light-coloured freestone, which has been much used in buildings in this part of England for many generations back. The shafts attached to the piers are, we were informed, of blue lias. The perishable quality of this material is evidenced so strongly, not only in the exterior, but in the interior of Wells Cathedral, where it was largely used, and where, even in the most protected situations, it has cracked and rotted away more like wood than stone, that we may hope we may have been misinformed, unless it be that a harder bed has been found. The wall forming the western boundary across the transept is retained till the completion of the nave, the two large buttresses which formerly occupied the position of the eastern responds of the nave arcade having of course been cut away to make way for the new work. There is little to attract in the exterior of the cathedral, but the architectural student will not fail to note in the interior the unique expression produced by the lofty and very pointed arcade occupying nearly the whole height to the springing of the vault, without triforium or clearstory, and giving a dignity of effect to what is really but a small building, and which, if treated on the ordinary plan, with low aisles and an arcade in the usual proportion to the superstructure, would have seemed a mere model of a cathedral. There is matter for much suggestion to the architectural designer in this treatment of a small building, as well as in the practical device before referred to for carrying outward across the aisle the thrust of the wider and heavier vault of the nave; the tall, massive external buttresses into which this same thrust is finally resolved giving to the exterior a slightly French aspect as compared with most of our other cathedrals. The choir-screen has been removed from the position in which it formerly stood (two bays to the eastward of the crossing, so as to leave a kind of quasi-nave), and a new stone one erected in the usual position. A feature in the choir is the series of monumental arches in the aisle walls, each with an odd canopy over it forming half of an eight-pointed star with finials at the points. While retaining this feature in the nave, Mr. Street has judiciously altered the design, which is more curious than beautiful, and substituted an ogee canopy with a finial: the carved ornament here, in the new work, is deserving of all praise. Among monuments in the cathedral, the bust of

Southey, in the north aisle, should not be overlooked; and on the south wall of the chancel is a brass to the memory of Bishop Butler (he of the "Analogy"). The good folk who "decorated" the cathedral for Christmas should learn to do the thing well, or not at all; anything more deplorable than the things like star-fish, hung about the walls at the time of our visit, could scarcely be imagined.

Crossing two bends of the river, and winding along the narrow "Redcliff-lane," we come to the real architectural glory of Bristol; for the Church of St. Mary, though mostly late in style, is for size, loftiness, unity of design, and richness of decoration, almost paramount among our parish churches. Restoration is progressing here also, under Mr. Godwin; the work at present going on consisting in the re-instating of the greater portion of the tower. The general aspect of this grand tower is too well known to need description; but it is not all who notice the difference of dates between this and the architecture of the church attached to it, the latter being Perpendicular, whereas the tower is Early Decorated, built before the completion of the lower structure. The door of the north porch shows some wonderfully elaborate and fine carving. But the grandeur of the church consists mainly (next to the tower) in the completeness and lofty proportion of the interior, with its aisled transepts and splendid vault, as yet undespoiled of its aërial effect by the hand of the modern decorator; and the large window in the north transept (by Clayton & Bell) is a very good specimen of delicate and harmonious colouring. The north aisle of the choir is terminated by a memorial window to Handel, put up at the hundredth anniversary of the great composer's death, and consisting of compartments illustrative of the subject of the *Messiah*, with a text and a few bars of the music over each. The decoration of the roof of the Lady Chapel is to be commended for moderation in colour; much more so than the east window of the chapel. The church contains a large double organ, placed half on each side of the choir. The most recent work in the church, the new reredos, will doubtless soon be illustrated.

Further out, in the parish of Bedminster, is a new church of some pretensions, in a respectable style of Regulation Modern Gothic. In Redcliff-lane we may notice the new tobacco warehouses designed by Messrs. Foster & Wood, in Egyptian style, with thick tapering columns and lotus capitals. What is the connexion of this style with the sale of "Bristol birdseye" it would be hard to say, but it may, at all events, prove a good advertisement to the owners, as few would notice so exceptional a building without stopping to inquire what it was. Some brick warehouses, not far from the railway station, built for Messrs. Waite & James, are worth notice, as a good specimen of bold and effective treatment of this class of erection, mainly in brickwork.

Exchange Buildings, near the top of Corn-street, must certainly, judging from the "handwriting on the wall," be the design of Wood, of Bath, architect in his day of the Town-hall at Liverpool and of other buildings of more than average merit in the style then in vogue. Opposite this the West of England Bank shows a dignified and effective interior, and an exterior front, which, like that of the Liverpool and London Insurance Company on the other side the street, is overdone with classic ornament in the way of wreaths, scrolls, &c., in the manner which seems proper to banks. Decidedly the best recent building in Bristol, however, is the New Assize Courts, by Messrs. Pope & Bindon, who gained the first premium, a little while since, in competition. This is a comparatively small and unpretentious edifice situated very much out of sight in Small-street (out of Corn-street), in late Gothic style, quietly but very picturesquely treated, all the details in good keeping and good taste, and the whole forming a pleasant contrast to some of the violent and spasmodic designs which are now put forward so often under the name of "Gothic." The Assize Courts lose nothing, it must be confessed, from comparison with the Post-office opposite,—a piece of threadbare classic design that might have come from the "Board of Works." Then there is the Colston Hall (so called from the well-known charitable citizen whose name is had in remembrance in Bristol), a large music-room, consisting, architecturally, of some acres of white plaster, with columns and Corinthian capitals in the same material, handsomely furnished with deal rush-bottomed chairs and with cold draughts in great variety, and culminating at one end in an orchestra and a large organ, the case whereof, we will charitably hope, was designed by the organ-builder's joiner. In this attractive temple of the Muses do attentive audiences assemble weekly to listen to the "recitals" of organ music on the instrument aforesaid (a very good one by Willis), given by Mr. Riseley, a comparatively young player, who is already known beyond his native town, and whose sterling abilities ought eventually to secure him a high place in his profession. We should not quit the lower town without a glance at the "Mayor's Chapel," a small church, the end of which faces College Green, opposite the cathedral; the interior of this also is well known to be worth inspection.

Park-street, a long, fine, very steep street, forming the main road to the upper suburbs of Bristol, has recently undergone at the bottom a treatment similar, on a small scale, to that bestowed on Holborn-hill, and a level approach to College-green substituted for what was a deep and inconvenient hollow. Near the bottom of this street, on the left side, is a bit of the handwriting of the late Mr. Cockerell, in the shape of a semicircular porch, forming the entrance to what was the Philosophical Institute, and marked by the purity and elegance of detail and treatment so conspicuous in all his adaptations of Greek architecture. Philosophy, however, has lately made a move up-hill, and (like many other things in the present day), taken up a Gothic tabernacle, in a building recently erected near the top of Park-street, and illustrated last year in the *Builder*. The main feature of the front is a porch or narthex, running right across the building, with an open arcade of pointed arches resting on thick shafts or piers of the proportions common in modern Gothic buildings; the two extreme piers at each side octagonal, the centre piers, which front the flight of steps for access, circular; the variation forming a happy little bit of architectural expression worth noticing. The general effect of the front is satisfactory, except the two little birdcage canopies over the angles of the cornice. The interior of the building is very plain and dead in comparison with the front, perhaps an insinuation that modern philosophy has more outside show than inside worth. A passing glance may be given to what is called "the Triangle," at the top of Park-street, on account of a long row of shops (by Messrs. Foster & Wood), showing one of the few attempts we have seen in modern streets, to give something like architectural character to the ground story of a row of shops. This is here done by a series of circular arches, springing from a square rusticated pier opposite the party wall of each shop, and from circular granite columns between the doors and windows, the whole thus arranging itself into groups of three arches. There is thus a sufficient basis, architecturally, for the superstructure, while no complaint could be made that the shops have not light enough; and though the details might be a little better, the general effect is very good, and quite worth imitating in other parts of Bristol and elsewhere. It is so easy to do something in this way to redeem shop architecture from the common absurdity of standing on a wall of plate glass, that the utter neglect of such an attempt in most places is as surprising as it is inexcusable. Further on, Queen's-road, a fine, broad "Boulevard"-looking street of good houses and plenty of trees, brings us opposite the Fine Arts Academy and the Victoria Rooms, both classic structures, Italian and Greek respectively, of the kind usually called in newspapers "handsome edifices"—an expression which speaks volumes to the architectural critic. White Ladies'-road (the name a reminiscence of a former convent or nunnery) continues the line, by a perpetual ascent, up to Redland, a pleasant suburb adjoining Clifton. The number of ecclesiastical edifices up this line of road is surprising. Keeping rather to the left from the top of Park-street, we come into the larger and better known suburb of Clifton, which has now extended down to the town, or the town has climbed up to meet it. Clifton is in one sense a remarkable example of what may be done to provide really pleasant and attractive residences in the immediate neighbourhood of a large town, where natural advantages of site are properly made use of. There are large towns in England possessing the same advantage of a fine rising ground behind the town, where this has been suicidally abandoned to the dominion of small and mean streets, redolent of public houses, and the whole advantage of the site completely thrown away: a stupidity with which the Bristolians cannot be charged. The only drawback to Clifton, as a residence, in relation to Bristol, is the steepness of the direct approach, which in bad weather renders it sometimes a real "Hill of Difficulty" to the pilgrim, whether on foot or on wheels. There is talk of a railway, after the manner of the "Metropolitan," from the town up to Clifton. There would have to be a good deal of tunnelling, and very heavy gradients; but, with proper appliances, there is no doubt the ascent could be accomplished, and it would probably prove in the end a paying investment of money. Architecturally, however, there is not a great deal to interest in Clifton. A series of wide, clean, cheerful-looking roads, very similar to each other, with plenty of gardens and foliage interspersed, and lined with a superior class of residences, in terraces or detached, cannot but convey a generally pleasant impression; but these houses are almost entirely of that same regulation "handsome" type which is so peculiarly uninteresting to the architect. Almost the only dwellings showing architectural feeling in design and in the use of materials, are those in connexion with the Clifton College, and a few near, which show a better style. The large, open square, thickly planted with trees, and with the tall and rather pleasing spire of Christ Church rising as a central object, forms, however, a very charming and picturesque suburban view. The new church of All Saints, by Mr. Street, of which only the chancel and transept are as yet built, must not be left unnoticed, as an almost typical specimen of the style and manner of its designer. The exterior will be like other churches by the same hand, plain, even to severity. The interior is diversified with natural polychromy obtained by the use, in piers and arches, of three stones,—cream-coloured, warm brown (in small quantities), and a light blue. The effect of this in the piers is not altogether happy: the horizontal rings of colour crowned by an unusually high proportioned capital, with foliage of almost Egyptian type in its flatness, give to the whole a half-Oriental—one might even say barbaric—appearance, original, certainly, but somewhat out of keeping in an English church. In the arches the effect is good; but here, again, we like not the introduction of the light-colured soffit-member inserted under the variegated archivolt, especially as constructive considerations have required an impost in one stone (blue) immediately over the capital, which thus stops the white stone a little above the springing, and gives it rather the appearance of a piece let in as an afterthought. The brass and iron chancel-screen is an unusually good specimen of design and workmanship, and the chancel roof is being elaborately painted; but the effect of this cannot be judged of while the scaffolding is up. A large east window by Hardman, representing the company of saints to whom the church is dedicated, is very pleasing in general effect of colour, but, as a composition, too crowded with figures. 13,000*l.* have already been spent on this church, and the work is now suspended for the collection of further funds; a temporary nave being erected for service, round which the walls of the real nave are partially raised. Whatever be the internal effect of the church when completed (and it is scarcely fair to estimate the design till this is done), it may be predicted that the treatment of the side aisles (intended for passage only), roofed by a series of small stone vaults at right angles to the main wall, will give an unusually severe and monumental expression to this portion of the church,—an expression which we only regret will not be carried out in the main roof also, which from appearances, is, we conclude, to be ceiled with the architect's favourite wooden barrel-vault in three or four cants, with ornamented iron tie-rods at the springing. The visitor may pass, by no very long stroll, from an architectural to an engineering work; we allude, of course, to the Clifton Suspension Bridge, a successfully-accomplished work carried out under considerable difficulties. Indeed, so impressed have the constructors been, apparently, with the hard nature of their task, that they have cut into the stone above the bearings of the chains their opinion on this head—"*Suspensa vix via fit*," which may be translated, "It's no easy thing to make a suspension-bridge,"—a statement no one will think of disputing, but which it hardly seems worth while to stereotype on the forehead of the undertaking. Whether from the banks above the bridge, or from the bridge itself, the view here is beautiful, with the lofty wood-crowned rocks rising up from the river as a foreground, and the view down the valley of the Avon, across the smoke

and towers of Bristol, to the distant rising ground beyond. Across the bridge are Leigh Woods, haunt of sketchers and other lovers of Nature, the beauties of which have been commemorated too in print, in as pleasant a book as one could wish for at an idle half-hour,—the "Sketcher" papers, formerly contributed to early numbers of *Blackwood*, by an amateur artist, the late Rev. J. Eagles, of Clifton, and afterwards published separately. It may be recommended to those who can find enjoyment in the descriptive writing and reflections of a thoroughly refined and educated mind, pursuing landscape art as a recreation, at a period when that branch of art, though haply showing less of accurate imitation than now, was certainly more of an intellectual and poetical study than it is with many of the artists of the modern school.

It would be almost ungrateful to take leave of Clifton without a word in appreciation of the amateur Madrigal Society's concert, an annual event here. The Victoria Room, with its "compo" pilasters and rows of plaster statues, is no very attractive place in itself (indeed, Bristol sadly wants a really fine public room); but the brilliant gathering this year at least amply made up for what the architecture wanted in colour and charm; and the sound of some of Wilbye's six-part madrigals, sung by a choir of ninety voices,—music, as Kingsley has truly said, "worthy of an age of heroes,"—is no unpleasing reminiscence for those "who have ears to hear," to carry away with them after a chance visit to Clifton.

ORNAMENTATION CONSIDERED AS HIGH ART.*

I WISH to make evident to you certain facts:—

1. Ornamental and pictorial art have been united in order to the production of certain works, as the decorated windows of the twelfth and thirteenth centuries, and the conventionally-treated floral subjects (and, I might add, figure subjects also) which adorned the Egyptian temples.

2. That when thus united they constituted, in the truest meaning of the expression, works of high art.

3. That those works which are most fully of mental origin, provided the impress of mind which they bear is holy and pure, are those which are most noble.

4. That pictorial art can, in its highest development, only symbolise imagination or emotion by the representation of idealised reality.

5. That true ornamentation is of purely m. tal origin, and consists of symbolised imagination or emotion only. I therefore argue that ornamentation is not only fine art, but that it is high art, and that it is, indeed, even a higher art than that practised by the pictorial artist, as it is wholly of mental origin.

This being the case, it is worthy of notice that ornamentation in its higher forms has always been the handmaid of religion, waiting upon it and serving it with a purity of purpose. The faith of the Greeks was expressed in their ornaments, and with the decorative forms of Arabian, Turkish, Moresque, art-passages from the Koran have always been richly interspersed; thus the aim of the artist has been to call attention to the sentiments uttered, by giving to them beautiful surroundings, and to convey an idea of the value of the truths recorded by placing them in contact with such works as is most beautiful and most true. It is so also with Celtic ornament. The finest patterns are here formed surrounding texts from our Scriptures, and thus calling attention to them. And these, by the intricate, yet beautiful, entanglement of lines which they present, symbolise the mystery to be unravelled by searching into the meaning of the Scriptural expression. Religion will go hand in hand with a pure development of that creative mind which God has given to us; but, directly purity of purpose is replaced by any low or sordid motives, then religion departs and leaves man to work out his own degradation; while it is a high art, and while a high art only, will religion continue to associate itself with it in the work of moral teaching.

There is one fact which I cannot now ask you to notice,—a fact in which I take the utmost pride, which is this,—that ornamentation has even united itself with works of utility, whereby it has attained to universality of power.

I take pleasure in the thought, I say, that ornamentation has even joined itself with works of usefulness; and this I do because it is pleasant to me to feel that I am ministering to other things in a manner that bestows upon them qualities such as ennoble them, and make them better than they would be without such ministrations. It has been said that "it is not good for man to live alone;" so I think it may be well that art should not live alone; and as it is right that the child be ministered to by those who give to it education of the intellect, grace of manner, and general attractiveness, and as it is right that the sick be ministered to in such a way as shall induce the bestowal of the charm of health, so I think it right and pleasant for our art to minister to common objects in such a manner as gives to them excellent qualities.

Especially do I take pride in this association of my beloved art with works of utility, when I think it has lent an exalted charm to hat which would without it be merely an article of usefulness, and that it has taught many an earnest lesson, as it has appealed from the wall which, without it, would merely keep out the weather, from a mat on which the knee has been bowed, or from a simple object of domestic service, as a cup or a bowl. If ornamentation is a high art, and consequently a moral teacher, as it certainly is, how interesting is the thought of its universality, both as regards time and geographical area. Ornamentation is the first art which man originates. The savage carves his war-spear and the paddle with which he propels his canoe into ornamental devices; and this he does long before he seeks to imitate, in a pictorial or sculpturesque manner, the forms of nature; and this ornamentation which he produces is not a form of art which is to lead up to pictorial work, as something which is higher than it, and then be abandoned; on the contrary, it is an art the highest developments of which have been contemporary with the highest forms of civilisation. It arose in a far-off antiquity as a sort of natural outgoing of man's mind; it developed itself with the civilisation of the Pharaohs; it flourished in Greece during the period of its highest refinement; and it has been the unvarying accompaniment of every marked period of mental or moral refinement.

Notice also its universality, as regards geographical distribution. In England we have ornamentation of some sort, or attempts at its production, associated with any object to which it can be applied. There is scarcely a carpet, a lamp, a bowl, a wall-paper, a window-hanging, on which some sort of pattern is not found. And England presents no exception to the general rule; for it is so, not in England only, not in Europe only, but wherever civilisation is found, and even further yet; for the wandering and savage tribes employ it on the few simple articles which they make. Works of ornamental art are not confined, then, to the few; they are not the inheritance of the rich merely; for it is amidst them that we live, and move, and have our being. Ornamental, beyond all other arts, is cosmopolitan in character. This being the case, what a power it might become for good if always employed as high art,—if always utilised as the teacher of morals, and the handmaid of religion. I rejoice in its universality, as it may become a mighty instrument of good.

These considerations are all-important to us, as England is the manufactory of the world's goods. Believe me that it is not sufficient that an art ministers to the caprices of the uneducated, or the depravity of patrons, nor even to those who seek after beauty merely. If a true art, it is above all this; and the artist, the producer of art, is unworthy of the name which he bears, if he does not use his every influence to so employ form and colour as to elevate his fellow-men. Think, my brother artists, of the vast area over which your works may spread, in these days of quick transit. Think of the good which you are sowing broadcast, if your works are but noble and pure; and then, I pray you, devote yourselves earnestly to the good work at which you labour.

These considerations lead me to notice that ornamentation as a high art must be truthful, beautiful, and powerful in expression, for if not so it cannot be a moral teacher. There is no expression of which man is capable which is more god-like than that of truth. Truth, how noble, how beautiful, how righteous to attend it, and how degrading is falsehood; yet we see falsehood preferred to truth—that which debases to that which exalts, in art as well as morals; and I fear that, as now practised, there is almost as much that is false, degrading, and untrue in my beautiful art, as there is of the noble, righteous, and exalted, although art should only be practised by ennobling hands. It is this grovelling art, this so-called ornamentation, which tends to debase rather than exalt, to degrade rather than make noble, to foster a lie rather than utter truth, which brings about the abasement of our calling, and causes our art in many instances to fail in taking hold of and clinging to the affections of the noble and great. If it were but invariably truthful in its utterance, we could then reasonably expect that it would prosper, having the sanction of the Most High.

All graining of wood is false, as it attempts to deceive, the effort being made at causing one material to look like another, which it is not. All "marbling" is false. A Brussels carpet that imitates a Turkey carpet is false, so is a printed fabric that imitates one which is woven, a gas-lamp that imitates an oil-lamp, and a flat ornament that imitates carved or relief forms of any kind. These are all untruths of expression, and are besides vulgar absurdities, which are the more lamentable as the imitation and false representation are always of a lower order than the works imitated.

To some present, a portion, at least, of the falsities which I have mentioned may appear as little matters, but this is not the case. I cannot believe in little sins and big sins; and even were there such, the little leads to the greater. The thief commences his downward career by little thefts. Mark this,—if not truthful in little things, there is but a small chance of a man remaining so in great matters. To the ornamentist I say, and this I do earnestly, that if our art is to prosper, and to take hold of the affections of the noble and the pure,—if it is to have the sanction of that Being who has given to man the power of producing the beautiful, it must be truthful in its minutest utterance.

Away, then, I say, with those detestable decorations which are now beginning to falsify the ceilings of the South Kensington Museum, and are teaching the public that a lying art is that which is worthy of their consideration and of national regard. Away with that, I say, which does not conform to this, the first of all requirements,—truth. Do you not know that whenever art has nationally departed from truthful utterance,—when it has sought to deceive, rather than lead the mind upwards to the fountain of all truth, that there has come its final overthrow? Pompeian art was false, and Pompeii was destroyed. French art, with all its prettiness, was not truthful, and France has fallen. Unless there is a noble aim in the production of our art,—an aim beyond that of merely pleasing the beholder—it cannot be a high art, and it cannot maintain a prolonged existence.

I must now notice my second statement, which is, that ornamentation must be beautiful in its expression. I need not enlarge upon this assertion, for that which is not beautiful can rarely be ornamental; but this I may say, that that which is beautiful manifests no want, no shortcoming. A composition that is beautiful must have no parts that can be taken from it while the composition yet remains equally good, or better. The perfectly beautiful is that which admits of no improvement. The beautiful is loveable, and that which is loveable takes hold of the affections and clings to them, binding itself firmer as time rolls on. If an object is really beautiful, we do not tire of it: fashion does not induce us to change it, the merely new does not displace it. It becomes as an old friend, more loved as its good qualities are better understood.

My third statement was this—that ornamentation must be powerful in its utterance. If power is absent from a composition, weakness is the result, the manifestation of which cannot be pleasant. Weakness is childish, it is infantine; power is manly; power is Godlike. With what power do the plants issue from the earth in spring. With what power do the buds develop into branches. The powerful orator is the man we admire, the powerful thinker the man we esteem. Even the simple power, or brute force, of animals, we involuntarily approve, for power is antagonistic to weakness. Power also manifests earnestness; power means energy; power signifies a conqueror. Our compositions, then, must be powerful.

But besides all this, we, the professors of the art of ornamentation, must manifest power in our works; for, being sent as teachers to instruct,

* By Dr. Christopher Dresser. From a paper read at the Society of Arts, February 8th.

ennoble, and elevate our fellow-creatures, we shall not be believed if we do not utter our truths with power. Let truth, then, be uttered with power, and in the form of beauty.

Here, again, we find the new ceiling decorations at the South Kensington Museum wanting, for they are not only without truthfulness, but they are as feeble in expression as a new-born babe. Look at the sketch decoration of the refreshment-room, or at the finished ceiling in the Majolica Court, and you will be astonished, I think, at the almost total absence of all that is beautiful, true, and ennobling in art. If a selection of the deformities of the most debased styles of ornamentation had been made, and that when these styles were in their worst periods, I cannot conceive of more unworthy results being achieved. In the name of truth, in the name of beauty, in the name of power, I protest against such.

I can only account for this national fostering of a quasi-Romanesque or Renaissance art in this way. Such a style does not consist of true ornament at all, but of pictorially treated fragments, as I have before said. It is, therefore, misapplied pictorial art, and has no association with true ornamentation. This being the case, and the authorities of the South Kensington Museum being either pictorial artists, or men with pictorial tastes, this fostering of a detestable mongrel art can be understood, yet it is none the less lamentable.

One great aim of the ornamentist must ever be the production of repose. The great ornamentists of past ages have been those men who achieved this most desirable result. To spend life where this is not achieved is, to the informed and sensitive mind, to be subjected to continued misery. This repose cannot be achieved by any Romanesque and Arabesque treatment; for these involve the production of pictorial fragments, each of which must be a "spot" in the composition, as it is a centre to which the eye is called. For this reason, were there no other, I should object to these styles; but, beyond all this such treatments are untruthful in their expression.

In this one fact, however, I rejoice. The authorities of the South Kensington Museum, if I rightly understand their characters, are men who have only to be shown that they are wrong in order that they may put matters right. I hope, then, that my remarks may reach their ears.

My time is gone, or I should have sought to show you that the art for which I now plead can soothe, as does sweet music; can cheer, as does the merry air; can hush to reverie, as does the solemn anthem; in short, that it can express and minister to all the various emotions of the passions or soul.

SCIENCE IN ARCHITECTURE.*

Cementing.

GOOD cement face-work will stand well for many years without being painted. Cement that requires painting for durability, and not for appearance only, is of inferior quality; the principal object in painting cement work is to give it a fresh appearance. The front of the old Compton House, in Church-street, which had all the appearance of stone, was good cement that had not been painted. Good Portland cement may be always told by its bright colour of bluish tinge; the common is a dull slate colour. For face-work, two of gravel and one of cement is the best mixture, with the finishing coat half and half; too much cement in the mixture making it, technically, too rich, is a common cause of cracks. Good cement, the second day, should be so hard that it cannot be broken without difficulty; that which will crumble easily in the fingers on the second day may be condemned at once as not good. Specifications often require that gravel only shall be mixed with the cement; that for mouldings should, however, be mixed with sharp sand, otherwise a smooth finish cannot be obtained. Portland cement should not be wetted on finishing: this perishes the cement. The first coat should be well wetted and soaked, then the last coat put on, and this not touched again with water. If rain gets to it before being quite dry it is very liable to perish; on the other hand, fire-cracks, common in cement works, often arise through the under coat being too dry when the last is put on. If cement be put upon a wall liable to damp, the wall should be allowed to dry first, otherwise the cement may perish. If this precaution is not taken, and the damp in the wall does not dry out quickly, or becomes renewed, the cement is sure to perish. The cracks that occur in the lining of rain-water tanks are not generally due to inferior cement, but to insufficient provision for bearing the weight of water. In making a rain-water tank of brickwork, it is well to build the half-brick lining in cement, and then form the bottom of the sides of the tank with cant angle bricks; this takes a great deal of the pressure of the water off the bottom, and throws it on to the sides, preventing leakages through cracks occasioned by settlements. The cant bricks may be put in after the tank is formed, set in cement, but they are better built in as the work proceeds, and bonded. For pointing about roofs, hair-mortar, mixed with cement, is better than cement only; it adheres when the heat and cold cause expansion and contraction, and does not crack through uneven drying; half and half is a right proportion. Good cement is often spoilt at buildings through undue exposure, or otherwise by want of care; when the men are disposed to put this into their work, it becomes difficult for the architect to detect the evil until too late. It is necessary to be very strict with men on the first evidence of indifference.

Plastering.

In lathing for plasterwork laths should break bond, an arrangement technically termed *snatching*: this gives a good hold to the joists, and makes a firm ceiling; instead of the lathing being executed with rows of laths of equal lengths, joined by other rows of similar lengths, the bond should be broken by changing the length of the laths every 5 ft. or 6 ft., and so causing one set to stretch across the joists to which the others have been fastened. This system takes more time than the ordinary system, and will not be adopted by men unless they are well looked after; it requires to be distinctly specified, on account of the extra labour. It is well to examine the cow-hair provided for mortar before it is used; hair ought to be long and sound, but often it is brought to the building in bags, of short length, and quite rotten, no strength in it. This sort of hair makes the plaster far worse than it would be without any. The plaster should also be examined before being put upon the ceilings, by holding a little up with a spade; the quality in this respect can be detected by the hair hanging down. The finishing coat of plaster is sometimes set with hair in it; the plasterer picks out the white hair and beats it fine, then uses it with plaster of Paris. The last coat should be composed of about one-third plaster to two-thirds of lime putty. The blotches or streaks sometimes seen in plaster walling are generally the result of bad work, though not so in all instances: a sooty or burnt brick in a wall will sometimes cause an unsightly patch on the plaster; marks from this cause have been known to come not only through the plaster, but the papering also. New ceilings ought not to be whitened; whiting eats into the new work and injures it. Lime for mortar should be burnt but little; much burning destroys its nature; the phrase "lime to be well burnt" is apt to mislead. When sluiced lime is much better than when slacked, in the common way; by sluicing I mean letting it fall to pieces, instead of running it with water; it becomes much more durable for mortar, and especially for pebble dashing in mortar. If in mixing the lime for mortar or plaster the least bit remains whole, though as small as a pin's head, it will burst in time and throw the plaster off the wall. This explains the cause of bursting occasionally seen on plastered walls. When the lime is run with water, this defect is not so frequent as when the lime is allowed to fall. The latter mode, however, makes a superior mortar; but the lime for this purpose is best prepared two or three months beforehand, which precaution prevents any portion of the lime remaining whole: it involves extra trouble in turning it over, which makes the mortar very expensive. I have known the following practice to be observed in making good mortar. The lime spread on the ground and a little water thrown over it; the whole then covered with sand, and left for three or four days. The water slacks the lime into a powder; this is then mixed with the sand, and the whole passed through a sieve; it is then ready to mix with water to form mortar or plaster.

The best way of forming plaster cornices is to run a muffled mould, muffled with plaster of Paris, upon a ground of hair mortar, and leaving about one-third of an inch to be run afterwards with plaster of Paris and lime putty; this makes a much stronger cornice than is made by the present system, which is only a result of a wish to expedite the work and make it cheap at the expense of quality of workmanship. Plaster cornices often crack through there being common plaster mixed with the good; the common sets more quickly than the good, and the uneven setting produces cracks. It is a common practice to mix glue with plaster when there is doubt as to its quality; the glue causes the whole to take a longer time in setting.

Plumbing.

No branch of the building trade requires more careful supervision in the execution of the work than this; defects creep in from all conceivable causes. I was recently asked to look at the iron cistern attached to a circulating boiler that had only been in use three years, but was now worn out; the house was of good class, 150*l.* rental. I found, on examination, that the bottom was completely worn through, and accounted for it thus: no steam pipes had been fixed, and hence the pressure of the steam had exercised a force upon the bottom and sides of the cistern, resulting in the effects named,—mild compared with what they might have been, for though the necessary steam pipes had been omitted, stop-cocks to the pipes had been carefully fixed. Evidently the steam had found its only escape through these pipes, and hence, had the stop-cocks happened to have been turned at any time, there would then have been no possible escape for the steam, and an explosion must have resulted. The work had to all appearance been committed to the care of apprentices, who did not understand it, and this is one source by which errors creep into this important branch of the building trade. On another occasion, on being asked to look at some property in course of erection, I found the lead pipes were all of considerably less weight than specified, and having them, as I thought, all changed, I discovered a length of the old piping left in a place where not exposed, the new being jointed to the old in such a position as almost to escape detection: there was an abundance of lead piping supplied for the purpose by the contractor, and the only conceivable cause for this deception was the disinclination of the man employed to put himself to the necessary trouble involved; and here again another source may be observed by which errors creep in. As another illustration, I recollect, on the completion of a first-class villa, part of the flashings proved to be of three pounds lead only: this, on being discovered, excited suspicion as to the whole of the leadwork; on examination, however, the remainder proved correct; and the contractor, who was an honourable man, accounted for the circumstance by supposing the man whom he had employed when engaged with that portion of the work found himself short of material, and used what was nearest to hand. Such circumstances show special necessity for careful and intelligent supervision of this branch of works, since, apart from malevolence, carelessness and accident may result in so much defective work that, though not at once apparent, is in the end the more injurious. Where there is a disposition to deceive, the facilities of plumbers' work are so numerous that the results are often infamous. In a recent erection in this locality, the sole contractor for which was a most honourable man, the roof, on completion, proved to be flashed with zinc, painted to resemble lead, as per specification, being fixed so as to deceive in those positions likely to be examined. The eye may soon become familiarised with the various thicknesses of lead sheets and pipes, and it is advisable to make an effort to retain this familiarity. In the islands at the north of Scotland I found, on a recent visit, that ordinary flashing is executed with 7 lb. lead. This is an unusual strength with us, but should be adopted everywhere, when the flashings are long or exposed to unusual tempest. Ways and means are continually evidencing themselves for saving expense in the manufacture of the numerous fittings required in plumbers' work, and a strong check is required on the part of the architect, while, on the other hand, it is no less important that he makes himself familiar with the numerous improvements that are continually being invented. To enlarge upon this latter subject would be out of place in this paper. Common brass-work in taps, &c., is often deteriorated by a mixture of zinc in the metal. This may be known by the light yellow colour of the brass when polished. The best brass-work, con-

* By Mr. Wm. Parslow. From a paper read at the Liverpool Architectural Society.

taining gun-metal, has a much darker colour. Lead-piping is often obtained cheap in Liverpool, made of old pipes, from which the solder has not been extracted in the ordinary way, and which, being left in the lead, necessarily destroys its properties. The regulating cisterns of some houses I recently examined leaked in most instances, though they were comparatively new. I found the cause was in the valve being flush, instead of being raised, a difference which considerably reduces the cost of cisterns, but detracts materially from their usefulness. The action of the plug and chain, assisted by corrosion, soon wears down the metal round the valve, causing it to leak; but when the valve is raised, as it should be, the thickness of the valve has to be worn down, which is hardly possible, before this tendency to leak can begin. A little difference such as this makes all the difference between good and bad plumbing; and, again, in reference to fixing these fittings, the cheap ways of jointing pipes may be soon detected; but we cannot readily observe when taps and cocks are secured with a mixture of packing and solder, instead of being neatly soldered only, which is essential for such fittings. Boss taps are best having a square knob attached to the boss to secure their hold in the wood or stone work. Otherwise, when the tap is screwed or unscrewed, the pipe will be twisted and so injured. Since the subject of using lead pipes lined with block-tin has been before us recently, I will not, as I intended, go into its merits, particularly as the chemical properties of the Liverpool water have not the action upon lead that is experienced elsewhere, rendering such pipes necessary with us; but, in reference to the subject, I heard of a case of lead palsy, where the doctors were at first puzzled to find out how the lead had entered the patient's system. They subsequently found, however, that he had been accustomed to drink water taken from a lead pipe, which, for a considerable distance, had been exposed to the outer air; and this circumstance was regarded by the medical men as the cause of the disease, inasmuch as chemical action sets in through the influence of water on lead pipes, much more seriously when aided by the external air than when the pipes are covered in the usual way. The circumstance suggests the necessity of caution in covering lead pipes. Lead pipes are liable to being injured by vermin. I have known rats to gnaw holes in gas and water pipes, and make serious havoc in a single night. Covering pipes with gas-tar is a good preservative, since rats will not touch this.

THE PRESERVATION OF BAALBEC.

SOME few days ago Mrs. Burton made a very interesting communication to the *Times* on the subject of the remarkable ruins of Baalbec, describing their present unsatisfactory condition, and the failure of an attempt to remove some of the modern obstructions, in consequence of caprice on the part of his Excellency Rashid Pasha, who at first sent from Damascus Mr. Barker, chief engineer to the Government of Syria, to superintend the work. Mrs. Burton says:—

"After examining the Saracenic capping of large stones overlying the south-eastern anta of Jupiter, and which seems to crush down the cornice and to exfoliate the columns at the joints, it was judged unadvisable to remove them. The cornice, broken in two places, inclines slightly outwards, while the stones are disposed exactly over the centre of gravity, and serve to diminish the thrust. We therefore left with regret this hideous addition, this *bonnet de nuit*, which must now be regarded as a necessary evil; and I may here remark, for the benefit of your general readers, that no one can form a conception of the size of the stones used for building Heliopolis, unless they have seen them. The three famous ones, measuring 64 ft., 63 ft. 8 in., and 63 ft. long,—each 13 ft. in height and breadth, and raised to a height of 20 ft. or more,—take away one's breath, and compel one to sit before them only to get more and more puzzled, and to think how very superior in stone-lifting and transporting the Pagans must have been to us in 1870.

The first work was to demolish the ignoble eastern masking wall. At an interview with the local authorities it was agreed that they should supply labour *on condition of being allowed to carry off the building material*. During our stay of five days, the upper part of the barbarous screen had been removed, much to the benefit of the temple; and it was a great excitement to the small population of the village of Baalbec to see the huge masses of stone coming down with a thud.

We intended next to expose, by clearing away the rubbish-heap at the proper entrance, the alt-reliefs extending on both sides of the great portal. Lastly, we had planned to underpin the falling key-stone with a porphyry shaft, of which there are several in the Jami-el-Kabir, or chief mosque. The prop was to be as thin as possible, so as not to hide the grand old eagle, emblem of Baal, the sun-god, which occupies the lower surface of the middle soffit stone."

As soon, however, as the work was commenced, Mr. Barker was summoned to Damascus by Rashid Pasha, who, after having offered to carry out the improvements, changed his mind suddenly, inexplicably, *à la Turque*. He objected to the building materials being given away, and gave Mr. Barker something else to do. Now, although the motive may have been different from our own, we are forced to say that we agree with his Excellency in this objection, and trust some other mode of payment will be found. It may be quite true that the only materials Captain Burton and his party were willing should be taken away were those of the modern additions and disfigurements, but the system is a most dangerous one, and its introduction would probably lead to great loss and injury.

Mrs. Burton gives a programme for a morning's work there:—

"The temples are, doubtless, the main attraction, but they are not everything, at Heliopolis. Walk up the hill to the south-east of the *Kala'ah*, examining the remains of the western wall about the gate now called '*Bawábel Dauris*,' or '*El Sirr*.' Visit the rock tombs and sepulchral caves, the remains of the small temple and Doric columns, and the Saracen *Kubbat*, or dome, under which lies Melek el Amjad, of the Seljukian dynasty. From this high point the view of the ruins and of the valley is absolutely charming. Descend to the nearest *mahla* (quarries), and measure—every one does with different results—the *Hajar el Hableh*, or 'pregnant stone,' as the huge unfinished block is called. Our measurement was 70 ft. long, 14 ft. 2 in. high, and 13 ft. 11 in. broad. It was doubtless cut and prepared for building, but not detached from the quarry at one end, and the extraordinary sight makes you exclaim, 'Something must have frightened them away before they had time to carry it off.' Ride to the *Kubbat Dauris*, the Wali, named from a neighbouring village; its eight columns of fine granite have doubtless been removed from the classic building. Thence proceed to the other quarries to the north of the temples."

Some of our readers who have lately visited the City of the Sun (we know two or three) will perhaps tell us a little about the actual state of the temples, and the steps that might wisely be taken in their favour. These marvellous relics of the past are the property of the whole civilised world, and all the world is bound to look after them.

THE CENSUS IN APRIL NEXT.

DOCUMENTS have been sent out all over the country to the local officers, in order that they may at once make the arrangements necessary for enumerating every living person in England in one day (Monday, April 3rd).

It is an arduous and important undertaking, and can only be accomplished with the assistance and goodwill of the public at large.

The first duty of the superintendents and registrars is to plot out the country into some 33,000 enumeration districts and to appoint enumerators. This is now being done. The assistance is required of the municipal and all other authorities in marking boundaries on maps, naming and numbering streets, &c., and in such other ways as are indicated in the Registrar-General's letter to the mayors and chairmen of local boards.

The scale of payment sanctioned by the Lords of the Treasury will afford a higher rate of remuneration than that assigned in 1861. It is hoped, therefore, that efficient persons will be induced to arrange for doing the important day's work, and that the returns relating to persons and houses will be both accurate and complete.

The public ought to be made widely aware that they are liable to heavy penalties if they refuse or fail to fill up the schedules, or do not fill them up truthfully and properly, to the best of their knowledge or belief. The local officers appointed will no doubt, when the time comes, give them every requisite information; and indeed the schedules themselves that will be left to be filled up are very simple and explicit, and give specimens, in print, of the way to fill up the blanks.

GENERAL EXHIBITION OF WATER-COLOUR DRAWINGS.

THE 665 pictures constituting the Seventh Annual Exhibition of Water-colour Drawings, in the Dudley Gallery, Egyptian Hall, include, with a large amount of small and namby-pamby art, a sufficient number of charming works to make a visit to the Gallery delightful. Artistic feeling and earnestness are to be seen scattered about, and serve, even where technical power may be less apparent, to attract attention and gratify the thoughtful observer. We cannot do better than send our art-loving readers to examine for themselves. Mr. F. W. Burton's "La Romanis" (172), Mr. Poynter's portrait of Lady Wensleydale (253), Mr. Marks's "Thoughts of Christmas" (269), "The Enchanted Forest" (8), by Mr. J. A. Fitzgerald, "Left Behind," by Miss Claxton (15), and "The Mystery of Faith," by Mr. S. Solomon (89), will not be overlooked. The drawing by the last-named artist on a screen, and Mr. Cave Thomas's sketches for decorations, are less likely to be seen unless looked for. Mr. Andrew Donaldson, Mr. Jas. Hayllar, Mr. Jopling, Mr. Joseph Knight, Mr. Playfair, Mr. A. C. H. Luxmoore ("The White Cockade"), Mr. Waite, Mr. Haynes, Mr. A. Severn ("Evening on the Tiber"), and Mr. H. Schlesinger, also send interesting examples of their art. Mr. Edward Fahey, in "Glaucē" (200), makes a jump forward. "Flounder Spearing" (217), by Mr. Hamilton Macallum, should not be missed, nor Mr. Macquoid's drawings of Spanish buildings.

PERMEABLE AND IMPERMEABLE FOUNDATIONS.

AT the close of Professor Ansted's paper at the Institute, part of which we printed in a recent number,* a discussion of much value followed. We must confine ourselves to some of the principal points mooted.

Dr. Henry Letheby said,—I think that in a sanitary point of view too much consideration could not be bestowed upon the application of geology to the whole question of building; as, for example, to the ground upon which a structure is erected, and also to the materials of which it is to be constructed; for every medical man of large sanitary experience must have been constantly brought into relation with very expressive facts, showing how terribly the question of the character of the soil, and the nature of the materials of buildings, have been neglected. The views to which Professor Ansted has directed our attention are, I think, especially worthy of the consideration of architects, because they show how intimately the geological features of a soil are related to many endemic diseases, and to most epidemics. This has been especially observed by Professor Pettenkofer in his examinations of the various outbursts of cholera in different places; and his views were singularly confirmed by the facts which presented themselves during the last epidemic of cholera in London. It happened, indeed, during the epidemic of 1866 that certain places in the eastern parts of the metropolis were entirely exempted from cholera, while neighbouring places were seriously affected by it; and when the whole of the facts were inquired into, it was found, most remarkably, that the character of the soil was essentially different in the two places, showing that it had much to do, on the one hand, with the prevalence of the disease, and, on the other, with immunity from it. In the City of London Union Workhouse, in the Bow-road, for example, where the force of the epidemic was most severely felt, and where in the course of three or four days there were no fewer than twenty-six cases of cholera in one set of rooms only—namely, the infirmary. In fact, during the interval from the 26th of July to the 4th or 5th of August, there were nearly fifty cases of cholera, and with one exception they occurred in that set of rooms only. This was a remarkable fact; and when it came to be inquired into, it was found, from an examination of the geological map of the district, that this infirmary of the workhouse in which the cholera cases occurred stood upon gravel, while the whole of the other portions of the building were erected upon brick earth or clay. Another case, to which I would refer, is equally instructive, for it shows how the geological character of the soil may affect cases of this description. In a pauper school, at Limehouse, with about 400 children, situate in the very midst of cholera that was raging about it right and left, even in the same street, there was not a single case of the disease. When the circumstances of that case were inquired into by Mr. Whittaker, of the Geological Survey of England, at the instance of the medical officer of the Privy Council, he ascertained that the school building stood upon a thick bed or island of brick earth, and not upon gravel as was supposed; while the neighbouring houses, in which cholera had been so severe, were built upon made earth and gravel. There are many such instances quoted by Professor Pettenkofer, and which might be mentioned if time permitted: possibly, indeed, the immunity from cholera at Wanstead, Walthamstow, Buckhurst Hill, Leytonstone, Stamford Hill, and North Woolwich, may

* See p. 22, *ante*.

have been due to this very same circumstance; but, on the other hand, though clay may be to a large extent a protection during a visitation of cholera, it is in other respects a most unhealthy kind of soil for a permanent residence; for it is provocative of rheumatism, phthisis, and other diseases produced by a damp atmosphere. It would seem, therefore that the immunity of a population from cholera, typhoid fever, and endemic bowel complaints, is dependent on the freedom of the soil from excremental soakage, and from variations in the level of the subsoil water. As regards phthisis, it is now abundantly proved that dampness of soil is an important cause of the disease, and that when works of drainage are carried out in any town, the mortality from phthisis notably diminishes.

Again: the character of a stone of which a building is constructed is not without its influence in the sanitary condition of a building. This is especially so in the case of public hospitals, where the porosity or non-porosity of the stone of the inner walls may actually determine the question of healthiness or otherwise; for a porous stone will so absorb organic effluvium, that it may at last be the means of rendering the wards uninhabitable. In such cases there is no remedy but the clearing of it out, and the thorough cleansing and disinfecting of the surface walls. All this would, I think, be prevented to a large extent by a careful consideration of the geological and physical qualities of the materials with which architects and builders have to deal; and this is especially needful in the case of hospitals and infirmaries, which require a stone of an impervious character.

Dr. Druitt said, I think my friend who preceded me is a little hard upon architects, when he suggests that they have not hitherto paid sufficient attention to the geological features of sites of buildings, and the materials of which they are constructed. When human beings employ physicians they expect them to cure the disease, though they will not help by giving up one error in their mode of living. In like manner, we expect architects to build healthy houses, although their clients prescribe not only the site, but the materials, the aspect, and every other circumstance connected with it. The lesson one learns, is what an exceedingly complex matter human life is, and how much it is affected by circumstances, whose influence no one dreamt of before. My friend Dr. Letheby may seem to some of us to have uttered a kind of paradox, when comparing Pettenkofer's researches with Dr. Buchanan's. In the first place, he pointed to the danger of too dry, too porous a foundation, and in the next place to the danger of too wet a foundation; and showed that in our endeavours to avoid phthisis we come in the way of incurring typhoid and cholera. Now, though somewhat puzzling, these statements are no doubt each perfectly true and consistent. Professor Pettenkofer promulgated the theory that the prevalence of cholera and typhoid was coincident with a *low* level of water in the subsoil. It has been shown by an American physician, and by Dr. Buchanan, that the prevalence of phthisis coincides with a high level of subsoil water. If we look at a town situated on a porous soil, we find multitudes of human beings contaminating the soil with those pollutions which are soaked up by the ground and usually carried away by the water which percolates the gravelly soil on its way to the nearest river; but when dry weather comes, then it is that what Dr. Letheby says happens—the soil becomes a medium of giving off the most dangerous miasmas, and the soil of the locality being foul and half dry, assumes the condition of an aguish country, which, if not thoroughly drained, had better be left wet than half dry. One is delighted to assist at a meeting like this, in which gentlemen engaged in one important function relating to human life, in providing buildings to insure protection from the weather, and the enjoyment of civilised society, are seeking for their profession a true scientific basis. With regard to geology, I have nothing to remark, but if it is within the scope of the meeting, I would call attention to the practice of erecting dwellings on what is called "made ground." It is a very remarkable circumstance that on what used to be the fields round London, where notices were exhibited that rubbish might be shot, and the scrapings of roads, and all other offensive materials were deposited for a series of years, there has now arisen a city of palaces. If there is any truth in the statement that emanations from the soil have an injurious effect upon the health of the people living in the houses placed in such situations, it is difficult to conceive that they can dwell in houses on such sites without deteriorated health. We have now before us the puzzling phenomenon of the great increase of scarlet fever, and other disorders which appear to defeat all our efforts for their suppression. Probably the condition of the soil below the foundations of the houses may be one element in the matter. If there be truth in the views of those who hold that water is the great vehicle of cholera and other disease, there can be no question that when water containing impurities is allowed to soak into the soil and is retained there, it will give off emanations highly detrimental to health. Whether taken as a drink, or inhaled as vapour, poisonous water is probably at the bottom of a large number of diseases.

Professor Donaldson.—We know, if we refer to old Vitruvius, that he has devoted the fourth chapter of his first book on architecture to the choice of site, and throughout his work we find allusions to the importance of careful consideration being given to the selection both of site and of water sources. I could wish that each young student possessed a copy of Vitruvius, and would read it through, for in it would be found not only illustrations of the canons of the ancients in regard to art, but practical lessons as to materials and construction, which are of the utmost value even in the present day. His was a comprehensive and judicious mind; and I am sorry to say that he is less valued than he deserves to be. In many cases it is necessary to attend to the substratum, to see whether it is sound naturally or artificially, and to ascertain whether there is cause to doubt the sufficiency of the substratum to support the buildings which would come upon it. We have a notable instance of this in St. Peter's at Rome. The edifice was built upon the ancient site of the Circus of Nero, and two bell towers were built on the front, which were obliged to be taken down from the insecurity of the foundation, there having been old constructions beneath. In the case of London artificial substrata arise from a variety of circumstances. There was, for instance, the old Walbrook. Many have been the casualties to the foundations of buildings in the bed of the old brook. Nothing could be more unreliable than building on such soil as that; and many of us here recollect the Fleet ditch lying an open stream northwards of Holborn, and since covered. The memory of the circumstances passes away. Architects build, not knowing the facts, on what they think is a good substratum; but below it is treacherous, and serious consequences ensue. In Egypt there are whole towns built in series one upon another. I have seen a hill cut through, and there were laid bare the strata of villages of different epochs one upon another. Occasionally the Nile overflows, sweeps over the mound, and reduces the mud-built houses to mud again. Then comes another generation of occupants, who build their houses upon the same mound. You find tombs, and sepulchres, and mummy cases of different successions of ages, of the successive inhabitants. Therefore it requires great care to be fully aware of the previous circumstances that have prevailed in certain localities. We have had some useful references made with respect to the unwholesomeness of houses. With respect to the Bow-road case mentioned by Dr. Letheby, it was certainly a very remarkable one. I should have thought myself that a substratum of that kind would have conduced to the health of the occupants, being partly on a gravel soil and partly on old brick rubbish. We have hitherto always considered that a permeable soil, which will carry away the surface water, was rather healthy than unhealthy; and that a compact soil, like clay, would retain the impurities that were carried into it. Therefore one can hardly find a solution of what appears to be an anomaly. Professor Ansted mentioned the Holborn Viaduct. I do not think that there is any fault in the foundation. The defect is either in the material used, or in the mode in which the joints are set. That I believe to be the cause, and not the effect of the subsoil of the Holborn Viaduct.

Mr. Wm. Haywood (learning that the lecturer's impression was, that the foundation had, to a certain extent, given way), said,—This is a practical point; and as there is nothing more instructive than an account of a failure when truthfully given, and though for reasons which I need not state here, I cannot enter closely into the cause of the fracture of the columns—though undoubtedly it will hereafter be discussed either in this Institute or before another body, to which most members of this Institute have access—still, as regards the foundation, I am quite prepared to tell the meeting all about it. The Fleet river was, at that spot, perhaps from 100 ft. to 150 ft. wide. In the course of time it became the Fleet sewer. The bottom of the old Fleet river was something like 20 ft. below the level of the street. The tide rushes up the Fleet-sewer, and fills it about two-thirds of its height. The height of the sewer is 13 ft.; the bed of the sewer and the bed of the old Fleet river being about the same level, has from 10 ft. to 12 ft. of water on it twice in every twenty-four hours.

The bed of the old Fleet river was in clay, and the bed of the sewer is in clay. The foundations of the Holborn Viaduct at that spot were put in bit by bit, without a coffer-dam, with the Fleet sewer between them, subject to the *enormous* scouring action which results from the drainage of so many miles of country, and to the tidal action; therefore, as you may suppose, the foundations were put in under great difficulties, and very much anxiety, and they were carried to something like 7 ft., and in places 8 ft. below the level of the old Fleet river, and solidly embedded in a compact mass of the London blue clay. I believe if you take the bearing area of the concrete base on which the granite pillars stand, it will bear per square foot of surface five, six, or seven times as much as it can possibly have to bear, supposing the bridge to be packed with human beings; and when a close examination was made by myself, and perfectly independently of me by three engineers not selected by myself, they found, as closely as it is possible to ascertain anything of the sort, that the foundation had not yielded in the slightest degree.

And now all I have further to say is, that those three engineers made their report, attributing the fracture to bad jointing, and I think any man who will take the trouble to go and look at this somewhat instructive partial failure, will be of opinion that the defect in the columns is attributable entirely to the bad jointing. Now, although I do not admit a defect, if there was a defect in the design at all, it was that I endeavoured to make too fine a joint, and expected as conscientious workmanship as if I had worked the stone myself. I did not get it, and a space of the thickness of a sixpence between the surfaces in such an inelastic material as granite, would be as likely to be the cause of fracture as if it were a much greater space. When the columns cracked they found their bearing, and they have never moved from that time to this.

Professor Ansted (in the course of his reply upon the discussion) said,—From the account which Mr. Haywood has given of having reached the London blue clay, it is clear that the view I entertained was incorrect, and therefore I at once withdraw my remarks with respect to the Holborn Viaduct foundation. At the same time, I would take the opportunity of reminding the meeting that a bed of clay reached under such circumstances in preparing foundations for a large construction might, though apparently thick and steady, have had below it another mass of alluvial matter and loose sand. I have myself seen such cases where loose and quick sands have underlain 40 ft., 60 ft., and even 90 ft. of thick sound clay. Similar cases are not even uncommon in river valleys, and I regret I did not quote some instance more distinctly to the point, and one in which I had the facts more completely before me. I hope, however, that Mr. Haywood will not think I had the slightest intention of throwing blame upon him. I was aware, from the reports of the engineers appointed to examine the work, that so far as he was concerned he was held perfectly blameless. There is one point alluded to by Professor Donaldson, which calls for a word or two from me: that is with reference to the case in which a permeable rock is supposed to carry away the moisture which falls upon or runs over it. Whatever may be the contents of the water that passes over or comes in contact with such permeable rocks, there will be no harm done if the whole can escape by natural or artificial deep drainage; but if the impermeable rock below is basin-shaped, the sewage matter that is carried down with the water is collected there, and may prove very mischievous. When the impermeable rock is clay, and the hollows on the surface are filled up with clay, the worst instances of miasma are, I believe, likely to arise.

WANT OF PROPER CLASS-ROOMS FOR SCHOOLS OF ART.

Some remarks in the last report of the Head Master of the Manchester School of Art, Mr. Muckley, may be usefully read and considered in other places besides Manchester:—I must now, he said, be permitted to ask your attention to the subject of lighting the class-rooms, for the more the students advance, the more the defect in this respect is felt by them, and it is quite impossible for me to make you acquainted with the hourly difficulties we have to encounter from this deficiency. The study of art is arduous enough when circumstances are favourable, but when impediments are increased by one the worst of all others, namely, the want of proper light, I am certain it often proves too much for the student to deal with. Nor shall we, I fear, be better suited with regard to this matter until a proper building is erected for the purposes of the art education of the neighbourhood. I trust you will give to this your fullest consideration, and that in a short time you will see your way to meet our wants. None but painters themselves can know the importance of a properly-lighted room for their work, and the most dignified object may be rendered mean and weak by improper lighting, while the most worthless one in nature may be invested with consequence by a well-arranged light; and I do not exaggerate when I say that a small apartment, not more than 12 ft. square, might furnish better accommodation as to light than the best room in this Institution. In some cases the studies will appear feeble and unreal, and this defect does not arise so much from want of power on the part of the student as from the imperfect arrangement of light under which the drawing or painting has been executed; and I am persuaded that the task of making a good study under existing circumstances is so great, that pupils become disheartened with their undertaking, and frequently leave the school altogether.

It is felt that art and its belongings require to be brought repeatedly before the notice of the English public, more than any other department of education; and if we are to succeed, it is necessary for assurance of its value to be insisted on continually by those who understand it best. The love of the beautiful in art has yet to be recognised amongst us as one of the subtle and for the most part hidden instincts of our nature, and to those who can cultivate it from proper motives, new and continuing sources of delight and happiness it will bring as a reward.

BUILDERS' BENEVOLENT INSTITUTION.

The annual ball, in aid of the funds of the Builders' Benevolent Institution, took place at Willis's Rooms, on Thursday, the 2nd inst., and went off well. It was attended by a numerous company, among whom we observed representatives of many of the leading firms. Dancing was kept up till very early hours to the good music of D. Godfrey's band. Those present were much indebted for their comfort and enjoyment to the indefatigable exertions of the stewards, and the secretary, Mr. Harris.

About 400 tickets were sold, and we are happy to add that the funds of the Institution were considerably benefited. It must be agreeable to those who originated this ball to know that altogether more than 2,000*l.* have been appropriated to pensions from the profit derived from these annual gatherings.

HOLBORN VIADUCT FRONTAGES.

Sir,—If your correspondent, "Observer," is correct in the figures he gives in the *Builder* for the 4th February, of the reserves fixed for ground-rents, he quite explains the cause of the lots being bought in. The amounts are excessively high and far beyond the value. It is well known to persons conversant with London property that house-rents in Cheapside are very high, and also in Oxford-street, though not so much so; but rather curiously it happens that in Holborn, although in the same main route, rents are very much lower than either. A good commodious house, with a 20-ft. frontage, can always be rented in Holborn for between 120*l.* and 150*l.* a year, and therefore it is out of all character to ask 120*l.* to 170*l.* ground-rent. The Farringdon-street frontages are also not worth high sums; for rentals in that street have always been low. It is a dull though a wide spacious thoroughfare. Estate Agent.

REDCLIFFE SQUARE, SOUTH KENSINGTON.

In the year 1861, a large tract of open land existed, lying between the Fulham-road and the Old Brompton-road. It was all used as market-garden ground, and the only communication between those roads was an ancient path known as Walnut Tree-walk. In less then ten years, Messrs. Corbett & McClymont, who took the whole of this ground upon building leases, have erected a very handsome estate, to which before we have had occasion to refer. The roads and sewers have all been made, and made well. Houses have been built to suit persons of different means, the rents varying from 46*l.* to 300*l.* per annum. The total number of houses, shops, and stables, now standing on the *ci-devant* gardens and rural lanes, is about eight hundred, and it is certainly a surprising fact that nearly all the completed houses are let.

The approach to the Redcliffe estate from the Brompton-road, after leaving the Gloucester-road station, was for some time open to objection, in consequence of its narrowness; but we learn that the road is now being widened, and it is but a few minutes' walk from the north-eastern corner of the estate to the Gloucester-road station. The West Brompton railway station is within a few minutes' walk of the north-western corner of the estate, and the Chelsea station and the South Kensington station are pretty close. These circumstances coupled with the nearness of the South Kensington Museum, and the Horticultural Gardens, may serve to explain the rapid letting of the houses.

For some years Messrs. Corbett & McClymont confined their building operations to houses, ranging between 46*l.* and 180*l.* per annum; but as they proceeded they got nearer to the district of South Kensington, and having laid out a handsome space as Redcliffe-square, they have erected two blocks of larger houses, designed by Messrs. Godwin, which they have styled Redcliffe Mansions. They are now about to erect, in the same square, a third block, the elevation of which we illustrate in our present number. Describing briefly one of these houses, we may say that the kitchen, scullery, butler's pantry, housekeeper's room, and so forth, are in the basement. On the ground-floor there are—billiard-room, 23 ft. by 17 ft. 6 in.; dining-room, 22 ft. by 17 ft.; and library, 11 ft. by 15 ft. The first-floor includes drawing-rooms, respectively 23 ft. 6 in. by 18 ft., and 14 ft. 9 in. by 10 ft.; the second-floor, third-floor, and attic, being devoted to bed-rooms, dressing-rooms, and baths.

Arrangements have been made for the erection of a large church, in the western half of Redcliffe-square, and the first meeting of the church committee is to be held in a few days, preparatory to putting up an iron building for temporary accommodation, whilst the church is being built.

THE CATHEDRAL OF BOIS LE DUC, HOLLAND.

Of this very noble structure we have already spoken, giving some description of the interior and an illustration of the remarkable metal font and cover it contains.*

This church may be looked upon as the Dutch Cologne; and, although far inferior to its German rival, it has the advantage of having been completed, with the exception of the tower and two chapels at the west end of the nave, nearly all in the same style, Early Decorated.

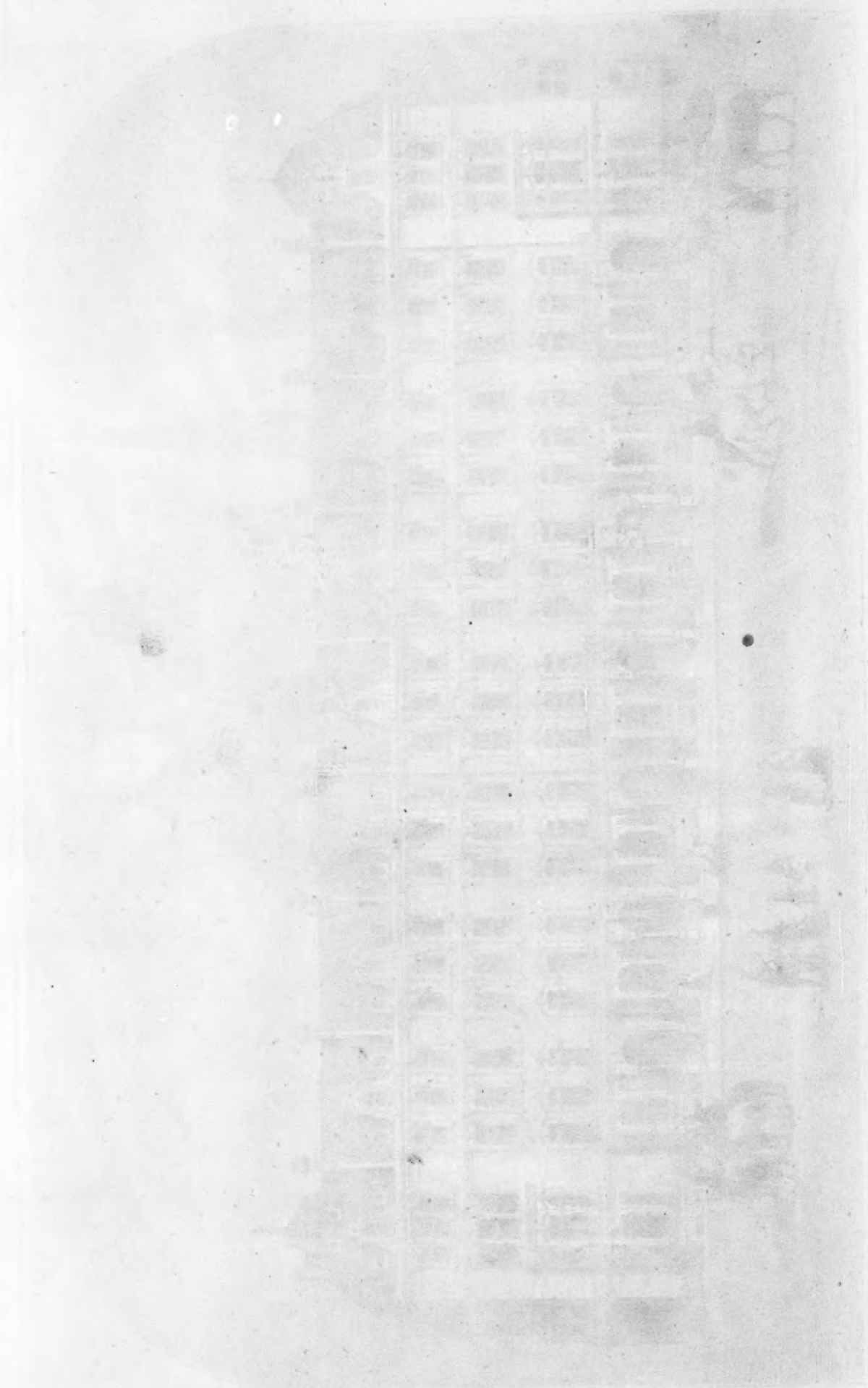
The church consists of a spacious choir and aisles, with a chevet and seven radiating chapels. To the north of the choir is the Chapel of the "Blessed Sacrament," as large as an ordinary parish church, consisting of a nave and one aisle, and ending to the east in an apse. On the south of the choir are two sacristies, the larger one ending also in an apse. Eastward of the chapel of the "Blessed Sacrament" is a remarkable octagonal structure, the lower portion of which forms a crypt; the walls of the superstructure are only raised a few feet, but are excessively elaborate. This building is shown to the right in our engraving. Could it have been intended for a chapter-house? If so, it is very interesting, as it is the only example of an octagon chapter-house we know on the Continent, except Bourgos. There are spacious transepts, each three bays deep; and over the intersection is a square lantern-tower, open to the church. The nave consists of nine bays, and has four aisles, two on each side. There is a large brick tower at the west end, which does not stand in the centre, but is quite out of square with the rest of the church. The lower part of this tower is used as a porch. Projecting from the north side of this tower is a transept opening into the two northern aisles of the nave. At the end of the south aisle is another transept, but only half as deep as the northern one; and attached to the south-west angle is a small tower and spire. The great western tower is capped with a lofty Late Dutch spire, consisting of a series of lanterns and bulbs, and, of course, out of all keeping with the rest of the building. It is, however, very graceful in form, and certainly adds to the picturesque appearance of the church.

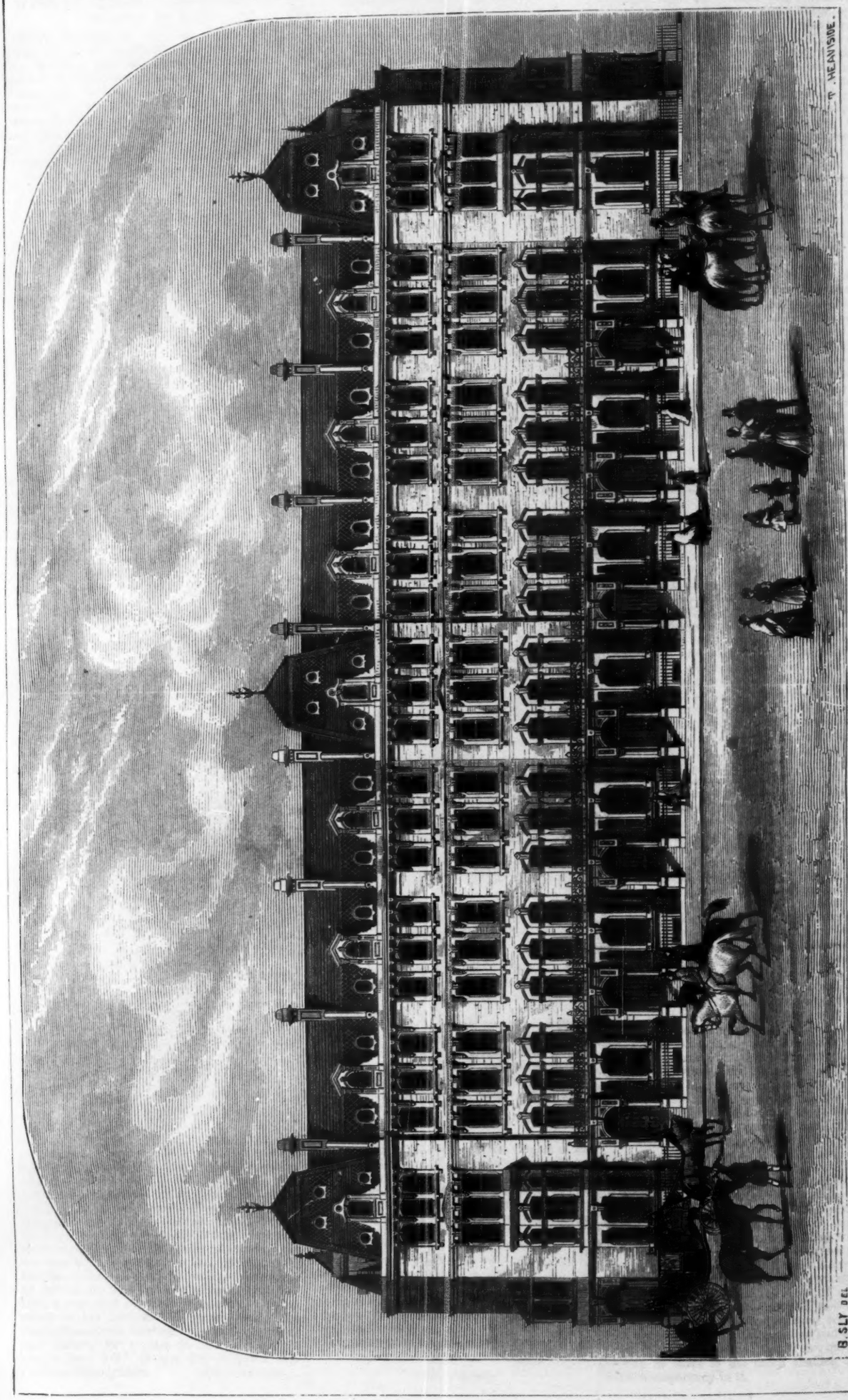
The general effect of the exterior of this church is singularly rich and fine: the best point of view is from the east, the point which our artist has selected. No church in Holland is so rich in sculpture as that of Bois le Duc; and, although much mutilated and injured by neglect and ill-usage, it still retains more than any other church in the Netherlands. The statues in the pediments over the windows (two in each) are exceedingly good, and also those in the great north-transept doorway. These latter have been carefully restored; but we cannot say the same for the rest of the sculpture in this portion of the church.

The centre lantern is a fine feature, and as its treatment is rather unusual we will give a brief description of it. In plan it is square, with the corners cut off, the place of the angles being supplied by octagonal turrets. On each of the large sides are two round-headed windows with circles above them. These were probably all filled with tracery originally. The peculiarity of this lantern is that instead of being raised above the ridge of the roof upon a square base it commences directly from the top of the four great arches at the crossing, and the roofs of the choir, nave, and transepts are hipped back to make room for it, and give light to the eight large windows with which it is pierced. This is also done at Antwerp, in the Cathedral and St. Paul's Church, and also in the church at Zutphen, but in these examples the effect is exceedingly disagreeable, as it gives the church the look at a distance of having been cut in half,—a defect which is avoided at Bois le Duc by the hipping being exceedingly steep, and in plan semi-hexagonal instead of square. Of course, the object of this arrangement is to get rid of the blank wall space above the great arches at the intersection, and to bring the windows low down, and certainly the fine effect of light given to the interior of the church is worth the experiment.

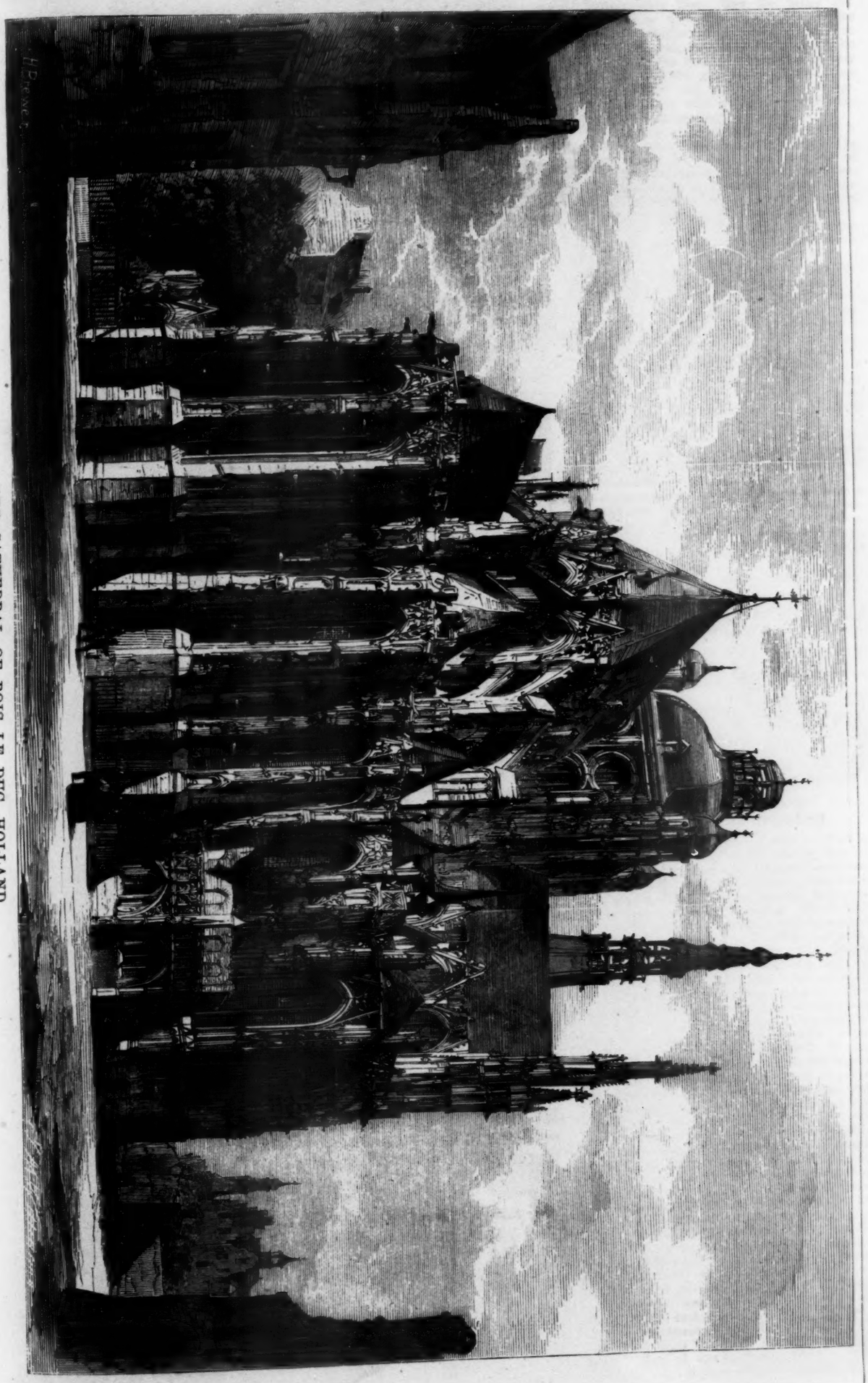
The transept fronts are singularly noble: the southern has a great open porch with two lofty arches, and the northern has a most superb doorway. This front has recently been restored by Messrs. Hesseman & Veneman, architects, in the town, and we wish these gentlemen had been a little more careful with the sculpture. The large group of the Coronation of the Virgin Mary in the gable is certainly not a faithful copy of the ancient one, in which our Lord was represented in the act of placing the crown on the head of his mother; whereas in the restoration the Virgin Mary is already crowned, and the Saviour is pointing up to the sky in a very theatrical manner, which suggests the ridiculous idea that he is giving a lecture upon astronomy. The new statues of the twelve Apostles on either side of the doorway are very tame and poor; the sculpture, however, of the doorway itself has been well and faithfully restored, and is of singular beauty. It is but just to the architects to state that all the new sculpture which was shown us in the workshops, and which is destined for the north side of the nave, is very good, especially the grotesques, gurgoyles, &c., which are careful reproductions of the old ones as far as they could be reproduced. The tracery of the windows, most of which had been removed many years ago, is being replaced, and all the windows filled with stained glass, arranged in geometric patterns. The windows of the apse of the great north window, and those of the two western chapels and the lady chapel, have been filled with stained glass, which is not so bad as much modern stained glass is; but is not quite satisfactory, as there is too much shading and too little transparency in it.

* See p. 10, *antr.*





STREET ARCHITECTURE: REDCLIFFE MANSIONS, SOUTH KENSINGTON.—Messrs. G. & H. Godwin, Architects.



THE CATHEDRAL OF BOIS LE DUC, HOLLAND.

HOLLOW BRICK WALLS.

SIR,—I am pleased to see this subject revived in your columns. Personally, I am beyond the reach of help, but in the interest of those who may hereafter build, I would desire to relate my experiences.

After a life of labour, I determined, having 3,000*l.* to spare, to build for myself a house. The ground floor I planned, the elevation and all constructive detail I left to my architect, desiring him, nevertheless, to give consideration to the employment of all such means as would be likely to produce the greatest amount of comfort.

In due course I received the plans, sections, and elevations. The walls were all shown *solid*, no provision was apparent for the utilisation of the "90 per cent. of heat" which, we are told, goes "wastefully away up every chimney," but in lieu thereof brick chambers were shown, and these I was assured, by reason of the heat due to the flues, between which they were to be formed, would carry off all heated or vitiated air.

I expressed a desire to have the walls built "hollow," particularly those south and west, but on being told that "hollow walls were the exception and not the rule," I gave it up, as I did also the use of "pottery smoke-flues, formed in the centre of an air-chamber."

My house has been completed six years; the walls, being solid, condense within the house as much moisture (this cold weather) as the windows, although the condensation is not so apparent. In wet seasons, the paperhangings on the south and west fronts are yearly spoilt, and boots or books placed in cupboards are covered with mildew. The flues constructed to carry off the vitiated air, instead of doing so, bring to the rooms (to the surprise of my architect, who always thought warm air "must ascend") a regular down-current of cold air; in fact, until the openings were stopped, no one could sit near the fires.

My house, instead of being a comfort, is quite the reverse; at this season, we are miserably damp and cold, and in summer we shall suffer equally from the extremes of heat; and this I now feel might have been obviated, had I insisted on having *hollow* instead of *solid* walls.

I trust you will find space for these remarks, as they may induce architects to consider the comfort of their clients, equally with the elevation they are called upon to produce. G. A.

*** It does not positively follow from what is stated, that our correspondent's architect did *not* give full consideration to the question of comfort. Fear of increasing the expense beyond the desire of the employer, and of running risk with new inventions, often leads architects to avoid desirable precautions, trusting that what has answered the purpose in other places may do so again. The simple adoption of a hollow wall, costing no more money than the solid one used, might have led to no better result. A hollow wall, unless built under continuous intelligent direction, has inconveniences of its own, and may prove a delusion. In the formation of the openings for doors and windows, for example, where the work must be solid, great care is necessary, especially in forming the heads to prevent the dripping of water, that may find its way in from above. Hollow walls, in theory, are excellent, but in practice they do not always prove so.

SIR,—In reply to your correspondent, who asks for some information about hollow walls, I beg leave to forward some remarks:—

In the first place, with regard to hollow brick walls built as he supposes of bricks on edge, alternate header and stretcher, he is mistaken in supposing that the damp will penetrate as easily as it does through a solid 9-in. wall; for here we have the middle 3 in. of each header exposed on all sides to a current of air, which will absorb nearly or all of the moisture before it can penetrate to the inside of the wall. We must remember that the air in the hollow of the wall will be dried by contact with the inner stretchers, and will be in motion on account of the difference of temperature between the upper and lower rooms of the house, whilst the numerous minute cavities in the work will allow of its escape and expansion.

In proof of one benefit to be derived from even such a wall as we are considering, I may mention a fact told me by a late resident in Canada. He was there acquainted with a working man who built himself a house with (for the sake of economy) such walls as we are describing; and it was found that the milk, &c., standing in that house remained unfrozen, whilst his neighbours' houses with solid walls afforded no such protection.

I am now building with hollow concrete blocks. I have made them to receive a half-brick wall on the outside with every third course binding into the blocks. A large villa erected on this plan last year has withstood all the damp out-giving powers of this very wet season. I may add that my plan is designed to give a house the advantage (if so considered) of appearing to be built of bricks; but, if cement is preferred outside, there is no reason why the cement blocks should not, if properly made, constitute the whole thickness of the walls, bearing only in mind that, for convenience in bonding into the flues, &c., they must correspond to a given number of courses of bricks in height.

ED. F. HUTCHINS, Builder.

YEOVIL AND THE YEOVILIANS.

SIR,—You have given our glove-making townsmen some hard hits: I cannot say they were undeserved. Instead of thanking you for pointing out social and sanitary evils, they have enlisted a crusade against your excellent journal, and the services of three journals are counted upon to crack stale jokes in the "Zummerset" jargon. The state of the Yeovil Union has been notorious for years to everybody here, and the man who never put his foot into the town could know this by reading the local and county papers that circulate in Yeovil. If Messrs. Pulman & Clinker were to send you up a file of their papers for the last three years, you would find a surfeit of town council squabbles and board of guardian rows here and there through them. On the whole, sir, we are not so bad that we might not be worse, nor so good that we might not be better; and if certain clackers in the council were only to attend to the business they were elected to perform, sanitary and social reforms would soon be apparent. Town clerks, instead of chairmen or committees, are often here the Sir Oracles. They are often the lord chancellors of Yeovil on a small scale. It is so with the masters in the union, and all goes "merry as a marriage bell" so long as the doctors are obeyed and posted up to the "latest intelligence."

If the Board of Guardians do not wish to bring down an old house about their ears they had better discreetly hold their tongues; if not, the best thing the ratepayers could do would be to demand *de novo* a searching Poor-law inquiry, dating back at least five years. I do not think that some of the present noisy clique would care to be put through their facings before a stern Commissioner. Yeovil is, as you say, "a slowly improving town," but if there were less *draining* within public-house doors, and more drainage through the town without, the social condition of the inhabitants would be wonderfully improved. We Yeovil folk are a queer, obstinate race, and many of us would die of the lock-jaw if we were deprived of our weekly "penn'orth of scandal." Thanks to the *Builder*, our rather unimportant town has been lifted from a region of eclipse into a region of light, and this fact has made the heads of some of our local authorities dizzy. Ever since the memorable 17th of December, in the town council, and at the meeting of the Board of Guardians, the moral of the frog in the fable is forcibly illustrated by officials and officious, in and out of office. TOM CORYATE.

Peter-street, Yeovil.

PRICE OF EARTHENWARE DRAIN-PIPES.

SIR,—A letter from "A Manager" under this heading calls for some remark to be made upon it, and, when analysed, will go far to explain the present scandalous disparity of prices.

Before proceeding with this, however, I wish to call the attention of your readers to the complaint made by "S. E.," in your number of Jan. 21, that there was not the same uniformity in the price-lists that there used to be. This is incorrect, as the ruling standard price in London and the South of England is still the "Lambeth list."

Your correspondent seems to be utterly unaware that there is also another standard list in use in the trade, for the Midland and Northern potters, equally authentic in these districts, where, from the close proximity of coal and clay, pipes have always been made cheaper, and of a stronger nature, than those of the Lambeth and Dorset manufacture.

Unfortunately these lists are being disseminated by travellers from some of the Northern potteries as a tempting bait to country customers, some of whom are not quite so *au fait* in the matter of discounts as they might be, and who give their orders at these "works' prices," *and pay their own carriage*. This is a matter with which every estimating clerk ought to be perfectly cognisant.

To come now to the real evil, I return to "A Manager's" letter; and, in passing, must call in question either the policy or the good taste of singularising the names of any particular firms, especially when, as in this case, two out of the firms so mentioned are notorious in the trade for never having abided by the rules or discounts of the London Potters' Association, and other names are omitted of really respectable firms. The latter part of "A Manager's" letter is singularly candid. His firm are not manufacturers, merely dealers, and here lies the scandal; these dealers buy from small manufacturers, generally speaking, a very inferior class of pipes, and at ruinously large discounts, of course, in many instances so much larger for *cash!*—that essential to small men!—enabling them, the dealers (I quote "A M.'s" own words) "to sell at lower prices than those quoted by small *manufacturers*." For this word "small" read *respectable*, and you have the truth, as good firms will not sell without a fair business profit.

There is also another form of competition, which we regret has been resorted to by some Lambeth and Dorset houses, and this is, their determination to have contracts at any price, sooner than allow the country firms to have a share of their monopoly. This they have been trying for years, with signal failure, and with a sacrifice of at least half a million of money; but still they pursue the same tactics, instead of letting their motto be

LIVE AND LET LIVE.

SIR,—If your correspondent, "S. E.", relies upon a uniform rate of discount as a basis for contracts, this may explain the great disparity we sometimes see in tenders for drainage.

The firm I represent has for several years discarded discounts altogether, and published a net list of prices of earthenware pipes, which for quality will bear comparison with those of *any* maker in the kingdom.

It will be London firms, chiefly, which are inconvenienced by the "disparity in discounts," as "country builders and contractors," and one or two West-end drainage engineers, are quite alive to the advantages of a list which quotes 6-in. pipes, for instance, at 10½d. per yard, delivered at King's-cross or St. Pancras, or stations of equal carriage-rate thereto, to those which quote the same thing at 7d. per foot, with a discount ranging from 30 to 45 per cent. ANOTHER MANAGER.

ARCHÆOLOGICAL SOCIETIES.

The Norfolk and Norwich Archæological Society. At the annual meeting of this society, held at the Guildhall, Norwich, the very rev. president, the Dean of Norwich, in the chair, there was a good attendance of members, and the table contained some interesting specimens. The Rev. C. R. Manning (honorary secretary) read the annual report, which was adopted. The Dean, in thanking the meeting for his re-election to the office of president, adverted to the restoration work going on in the nave of the cathedral. He said that no doubt most of the members were aware that at this time the roof of the nave of the cathedral was in process of being cleaned of the dreadful wash—not white-wash, but "brown-wash"—put on it at the beginning of this century. In the easternmost bay of the nave proper, the bosses had been painted, but the paint used was like that with which they were formerly covered, and of which traces remained. He thought that was a safe plan on which to proceed; and, upon the whole, he was tolerably satisfied with the effect; but others were not. An authority in these matters, the Rev. Whitwell Elwin, of Booton, paid him a visit, and he represented to him that nothing had been done but that for which there was ancient authority. Mr. Elwin said that he was quite aware the bosses were originally coloured in the manner now being done, but, he said, "In restoring anything, you must remember that you should never do so independently of the conditions under which the thing was done originally. I have no doubt," he said, "that when the roof was put up in the middle of the fifteenth century, the whole of the windows of the clearstory and of the triforium also were filled with the most beautiful coloured glass. That, of course, would throw a vast amount of coloured light into the cathedral, and

you would see the bosses not spotty as now, but harmonised and mellowed. Therefore, unless you can restore the windows (which would be so vastly expensive as to be impossible), do not restore the colouring; only remove the brown-wash." Since Mr. Elwin's visit, he had discovered more colour, not on the roof itself, but on the spaces intervening between the roof and the clearstory, and on the columns above the clear-story,—a tracing of lines, sometimes red and sometimes black, apparently to represent brick-work, and in one place Purbeck marble. Some of the colouring had been restored, and, to his mind, carried off very much of the spotty effect to which Mr. Elwin referred. He was not at all sure whether, if the whole colouring was reproduced in that way, the spotty effect of the bosses would not be entirely removed. He should be glad if the members of the society would visit the cathedral, and give him their opinion on the subject. Mr. Morant, engineer to the Norwich Board of Health, contributed some Roman relics, found in the sewerage excavations, accompanying them with a paper, which was read by Mr. Fitch.

The Leicestershire Architectural and Archæological Society.—The annual meeting of this society has been held in the Town Library, Guildhall, Leicester; the Rev. J. H. Hill, F.S.A., in the chair. Mr. North, the honorary secretary, read a statement of accounts for the past year, showing a balance in favour of the society. He also presented and read the report of the committee for the year 1870. Some architectural plans, antiquities, &c., were exhibited.

THE WINCHESTER TOWN-HALL COMPETITION.

AFTER long discussion, and the proposal of several amendments, the design No. 25, marked "*Utile Dulce*," was selected as the best, and was found to be the work of Messrs. Jeffery & Skiller, of Hastings. The second premium, 50*l*., was awarded to No. 1, "*Tria Juncta in Uno*."

METROPOLITAN BOARD OF WORKS.

TRAMWAYS—EMBANKMENT FOUNTAIN—BUILDING DISPUTES.

AT the last meeting of the Board a communication was received from the Board of Trade, stating that the resolutions of the Metropolitan Board of Works giving consent to certain portions of the tramway scheme had been considered, and applications had been made by the companies for provisional orders.

A report was received from the Parks, Commons, and Open Spaces Committee, submitting a design for the erection of a fountain in the ornamental grounds of the Victoria Embankment, and recommending that the general features of the design be approved, subject to the whole of the working drawings being submitted to the committee previous to the contract being let. The cost of erection and the specification together would, Mr. Westerton stated, be 900*l*. After some discussion, and more than one amendment, the report was withdrawn, and an amendment by Mr. Roche accepted, to the effect that the design should be reported upon by the engineer and architect to the Parks Committee. Before the Board were called on to agree definitively to a design, Mr. Roche said, he thought two or three ought to be submitted for consideration. For the credit of the Board they ought to take some little time before coming to a decision, and secure a fountain that would be satisfactory when erected. It would save them from a great deal of unpleasant criticism hereafter.

The Board then proceeded to consider and determine several matters of disagreement between Mr. George Legg, district surveyor of West Hackney, and Mr. William Henshaw, builder, of City-road Basin, respecting the mode of construction of a Presbyterian Church at Downs-park-road, Clapton; and with Messrs. Dove, Brothers, builders, of Islington, respecting the mode of construction of a Congregational Church and Lecture-hall at Stamford-hill.

The Board having heard the persons in dispute, and considered the reasons advanced by Mr. Legg in support of his requirements for greater strength in the buildings, resolved in most cases to enforce his recommendations. Protests were entered by several members against the proceedings as being a farce, the only guiding motive in the decisions seeming to be a determination to support their officers. One point was reserved for discussion for next week.

SLATE CISTERNS.

SIR,—I do not know of any easy or good plan whereby the leak in the cistern (if leak there be) may be cured. The leakage does not arise from the slab being too thin, as 1½ in. is quite thick enough for the depth of 1 ft. 6 in. I am inclined to think the slab came from a particular kind of slate rock, most likely from what is called bastard rock, some of which is comparatively soft, and consequently porous, which makes it easy for the workmen to work. A large number of cisterns are in use in Devon and Cornwall, and other counties, made of slabs from the Old Delabole Slate Quarries, but I have not heard of one of them sweating in the way named by the "Builder in a Puzzle." The rock from which those slabs are produced is well laminated and solid.

FORT ET FERME.

SIR,—In your last impression, page 91, a puzzled builder asks "if it be possible that water can sweat through a 1½ in. slate slab, and thus collect on the bottom of the cistern."

In reply, I beg to say, it cannot. The water which "collects and drops" is not due to percolation, but to condensation. Slate, glass, and iron condense moisture in air more rapidly than any other materials; and the cistern, being charged with water, lower in temperature than the surrounding air, increases the condensing power of the slate bottom. The small air-brick near the bottom of the cistern referred to, "for the purpose of giving air," should be immediately removed, and the space between the ceiling and the bottom of the cistern made, if possible, perfectly air-tight; as, in the absence of an air-supply, condensation would be checked.

The bottom being dry in frosty weather need excite no surprise, as the air at such a season is lower in temperature than the slate cistern and the water it contains.

As the bottoms of slate cisterns or slate slabs form excellent coverings for roofing-in small inclosed spaces or projections from principal buildings, I would advise your correspondent to continue their use; but in the future, before fixing them, he should mix up sufficient Portland cement and sand to cover the whole of the *under* face, leaving the surface as rough as possible. At any convenient time, after the cement has set, the slab may be raised and fixed. When the external arrangements are complete, I would advise the rendering of the under side of the cistern or slab with Portland cement; the *first* application will form an excellent key for the *second*.

This coating of cement, if it does not wholly neutralise the condensing power of the slate bottom, will certainly diminish it, and by absorbtion prevent the "dripping" of which your correspondent complains.

GEORGE JENNINGS.

READY-MADE PLANS.

THE following letter appeared in the *Guardian* last week:—

"SCHOOL PLANS.

SIR,—If your correspondent 'G. F. B.' will communicate with me, I shall be happy to furnish him with 'good, plain, as well as decent-looking plans for a village school and teacher's house,' together with specifications.

Having had some practical experience in building, I have prepared a set of plans for school buildings in my own parish. They consist of ground plan, chamber plan, three elevations, three sections, drawn to quarter scale, carefully figured and ready to go to the builder, or be laid before the Diocesan Board.

Our school is intended to accommodate thirty-two children, but I shall be happy to adapt the plans to any larger number. The above have been approved by our Diocesan School Board, and have obtained a grant.

Having both schools and parsonage-house to build, I cannot afford to *give* the plans, but will furnish them to any brother priest in return for a small contribution to our building fund. Address, in the first instance,

B. A. OXON, care of, &c."

Because a parson has made some plans for a school the size of a Manchester omnibus, licensed to carry thirty-two inside and out, he wants to sell them to any person silly enough to buy them, for the purpose of raising the wind necessary to blow together an amateur parsonage-house.

It has been often decided that the clergy shall stick to their clerical duties, and "not serve tables;" nevertheless, some manufacture and sell lithographed sermons, but we never knew any man, woman, or child the better for listening to them. The clerical plan-maker seems to think his building can be equally well made in brick, stone, or stucco, and be equally well placed upon gravel, clay, fen bog, or rock foundation. Surely, in this latter part of the nineteenth century the public are wise enough to know that every building should be specially designed for its own locality by men specially trained for such work.

BRESSUMMERS.

SIR,—Will any of your readers kindly inform me of a formula by which I can ascertain the breaking-weight of an ordinary Bressummer, constructed of two deals, with an iron flitch between, and bolted together? T. D.

WHO IS SPOTLESS?

SIR,—Time sets his imprint on us all; and we leave our footprints everywhere, during this muddy weather; but it is exceedingly annoying to be *spotted* by every "hansom" and other fast-going vehicle that dashes by us. A splashed Adonis and his spotted lady are pitiful. It is of no avail to speak to the besprinkled constable,—he will not stop drivers from squirting mud; but if they "crawl," then he can stop them! Some shop-fronts receive liberal contributions of opaque tears, which trace down the panes, painful enough to shopkeepers.

Now, sir, for the remedy,—two short pieces of plate-iron or tin, about 4 in. in length, bent low outside of the wheels. They would receive all splashes, thus preventing much annoyance, at small cost. These plates of tin can be fixed on the iron rod under every hansom-cab. If adopted, it would be a spotless improvement.

R. T.

NOISY IRON SHUTTERS.

SIR,—Will you allow me to call your attention to a most intolerable nuisance under which I and my family suffer (also, as I understand, most of my neighbours who are not concerned in its perpetration), which seems to me to be clearly a case of defective construction. It is this. Right opposite my parlour-window,—I will not say where, in the meantime,—there has recently sprung up one of those showy corner tenements, adorned with revolving iron shutters on all the shop-windows and doors, which are now so very common in the principal thoroughfares of our large towns. I will not complain of its architectural design, though that is an eyesore (we must submit to eye-sores now-a-days), but I do complain most bitterly of the horrible infliction my poor ears are made to suffer from the opening and shutting of those confounded shutters! In this same block there are six shops, with three openings each, in all, eighteen shutters; and the noise of opening and shutting each shutter is something, I fancy, which can only be compared to the fearful grating of a *mitrailleuse*, when it is in action. It would be some consolation if they were all opened and shut at the same time; but some open at six, some at seven, some at eight, some at nine in the morning, with a similar prolongation of the agony every evening, when they are shut. And so the peace of a quiet neighbourhood has been spoilt, and our rest disturbed, and poor invalids (such as we actually possess amongst us) robbed of their repose. Can nothing be done to help us? A. M.

THE PREVENTION OF KITCHEN BOILER EXPLOSIONS.

MESSRS. A. BOYD & SON write,—"Regarding the mercurial valve suggested in your paper, we beg leave to say we have been engaged for a month in investigating and perfecting this plan. Medical men and analytical chemists, whom we have consulted, say there is risk, although very slight, in using water, for drinking or for culinary purposes, that has stood in contact with mercury: we therefore so bend the tube that water and mercury are completely separated. This we have patented."

SATURDAY HALF-HOLIDAY.

IT has been suggested that something should be done to obtain the Saturday half-holiday for such in the architectural profession as at present are denied it. And as it will greatly facilitate the matter to know to what extent the half-holiday is recognised by the profession, will you kindly allow me to ask, through your columns, if one gentleman in each office in London will communicate with me, stating whether or not the Saturday half-holiday is the custom in his office. The result of this I shall be glad to forward you, but of course withholding names.

By inserting this you will confer a great favour on such as, like myself, are kept behind the age. A. Y. Z.

10, *Walbrook, E.C.*

THE PLAGUE OF ASHES.

THE enormous sums now demanded by the gentlemen contractors in the "breeze line" to rid us of this commodity should induce the vestries to offer a premium for the utilisation of it. It is said that brick-making near London has almost ceased; but there must still be a great deal more than there was some forty years ago, when "flying dustmen" abounded, and a dust-heap was a dowry for a belle at Battle Bridge. Has the gas-coke lowered the value of the cinders? And why not use the fine sifted ashes for mortar, at half the expense of river sand? And, no doubt, it might be profitably used with dry stuff off the macadamised roads and tar in making up the footway, in the suburbs, at a cost

of about 1s. 6d. per yard, instead of the present gravelling, which is an annoyance in a dry summer and in a wet winter, if the parish surveyors were induced to make a few experiments to that end. PRETIOSUM QUOD UTILE.

CHURCH-BUILDING NEWS.

Worksop.—After the death of the late Mr. George Savile Foljambe, of Osberton Hall, near Worksop, which took place twelve months ago, it was deemed advisable that some fitting memorial should be erected to perpetuate his memory. It was decided to erect a reredos in St. John's Church, the money to be raised by subscription. The memorial, which surrounds three sides of the chancel, consists of a reredos and an arcade of sixteen panels. The arches of the latter are moulded and filled with polished Sicilian marble, and are intended to record the names of the successive vicars of the church. The space below has been filled with geometrical mosaic tiles. The reredos is formed of three moulded arches, cusped and supported on shafts of Belgian marble. The panels are of figured Derbyshire alabaster, the centre one containing the sacred monogram illuminated in gold and colours, while those on each side are decorated with incised symbolical devices. With each device is interwoven an illuminated ribbon, bearing the texts, "I am the living bread," "I am the true vine." Immediately above the communion-table are the words, "This do in remembrance of me." The reredos terminates in a crocketed gable, in the centre of which is a carved trefoil panel emblematical of the Trinity. The memorial is Early English in character, to harmonise with the style of the church, and has been designed and carried out under the superintendence of Mr. Theophilus Smith, of the firm of Messrs. E. & T. Smith, Sheffield.

Southport.—The newly-erected church of All Saints, situated in Queen's-road, near the Hesketh Park, in this town, has been opened for divine service. The town, we believe, is indebted to the Rev. Charles Hesketh, rector of North Meols, and his family, for the ground upon which the church is built, and for the entire cost of its construction. The edifice is in the Early Decorated style of architecture, and the dimensions are as follows:—Length, 73 ft., and width 42 ft.; chancel, 25 ft. by 20 ft.; height to the ceiling line, about 34 ft.; and belfry with spirelet, height 90 ft. There is also an octagonal vestry on one side of the chancel, with entrance from it direct to the pulpit, while on the opposite side is placed the organ-chamber. On the west side there is a three-light window, and above this a large deeply-recessed rose window, about 12 ft. in diameter. All the windows are in tracery. The exterior is faced with stone throughout. All the woodwork, including the seats in the body of the church and in the chancel—the latter for the choir—is of pitch pine, stained and varnished, and the pulpit is of Caen stone, with red Mansfield stone shaft, while the whole of the aisles, approaches, and chancel are laid with Minton's encaustic tiles. The church is intended in the first instance to seat 500, and it is so constructed that, by means of a gallery, room for 100 more may be easily provided. The whole structure, in fact, is so planned, that by means of transepts it may be enlarged so as to accommodate 1,100 persons. The building is heated throughout with hot water. Mr. J. Sidebotham, of Southport, was the architect; Messrs. Wishart & Irving were the contractors; and the sub-contractors were,—for brickwork, Mr. Smallshaw; stonework, Mr. Greenwood; plastering, Mr. Blanchard; plumbing, &c., Messrs. Burland; painting, Messrs. Raith & Co.; and heating apparatus, Mr. Seth Moore. Messrs. Sidebotham & Co., of Manchester, have had the entire fitting up of the seats, pulpit, &c., in the interior.

Baylham.—The parish church here has been re-opened, after having undergone a restoration. The walls were much out of repair, as was the interior generally, whilst the church was fitted with old square pews and a gallery at the west end. Externally the church, which is dedicated to St. Peter, and which consisted of nave and chancel, with west tower and south porch, was a fair specimen of the simple village church. The additions which have been made consist of north and south transepts, that on the north side being built over a vault belonging to the Acton family. The old pews have been cleared out, and oak benches substituted for them, considerable additional accommodation being thus obtained in the nave; and to this the further floor-space of the transepts must be added. The west gallery has been taken down and the tower arch opened. The space in the tower is used as a vestry, the screen separating it from the nave being formed out of part of the old rood-screen, of carved oak, which was discovered when the pews were removed. The screen is about 7 ft. in height, and does not in any way interfere with the two-light west window, which was formerly blocked up by the gallery. In this window some old stained glass has been reset, and in common with all the windows in the building, it has been reglazed in lead quarries. The centre passage of the nave is some 6 ft. wide, and at the junction of the transepts with the walls of the chancel, which is on the same level as the nave, this is extended so as to make a broad open space. The tiles used in paving the chancel and transepts are Maw's, and those within the communion-rail are encaustic. Stone arches springing from moulded corbels open from the chancel to the transepts, and a new stone arch separates the nave from the chancel. The walls have been re-faced and re-plastered throughout; the old lath-and-plaster ceiling has been removed, and a new one, composed of chestnut boarding formed into panels by moulded ribs, substituted. Two oak beams, part of the original construction of the building, still remain, but additional support is given to the roof by carved king-posts which spring from these beams. A new oak reading-desk, in which the remainder of the old rood-screen has been utilised, has been placed on the south side of the nave, and a pulpit of chesnut wood on the north side. The church is warmed by an apparatus by Rimmington, of Skipton. Externally, the plastering of the walls has been removed, and the rubble facing repaired and the joints pointed with blue mortar, both old and new work being thus given a uniform appearance. Wherever possible the old windows have been preserved and new stone has been used to repair the dilapidated portions. There is ample evidence that the building was repaired at various periods, almost every variety of style being noticeable. In the south wall of the chancel, which has been taken down in order that the transept on that side might be added, was a Perpendicular window; this has been placed in the north wall at the west end of the nave, where there was a deficiency of light. In face of the absence of anything like uniformity in the style of the old building, the architect, Mr. F. Barnes, Ipswich, has not felt himself bound to any particular style in the new work; and he has put windows belonging to the Decorated period, with tracery of a flowing character, in the transepts, those in the gables being three-light and those in the side walls two-light. The old east window was found to have been badly mutilated, wooden mullions having been inserted in the place of masonry, but some portions of the original outline remained, and from these examples the architect designed a new stone three-light window, of early character, and this has been filled with stained glass, by Clayton & Bell, presented by the family of the late rector, the Rev. W. Colville, as a memorial of that gentleman. The east wall has been strengthened by the addition of two buttresses. The tower was found to be in a very fair state, and has required no external repairs, but the interior was completely renewed; the peal of five bells being taken down and rehung. The work has been executed by Mr. Vine, stonemason, and Mr. Daniel Day, both of Eye, from the designs and under the direction of Mr. Barnes. The total cost has been about 1,000*l.*

St. Asaph.—The erection of a reredos in the cathedral, presented by Mrs. Hesketh, of Gwrych Castle, has now fully completed the ornamentation of the choir and chancel. The design is by Mr. Gilbert Scott, and the sculpturing by Mr. Earp, of London. It consists of an entablature in alabaster, with arcading on either side. The sculpturing which adorns the entablature represents the procession to the place of Crucifixion. In the centre, which is surmounted by a dome terminating upwards in a pinnacle of rich tabernacle work, is the figure of Christ bearing the cross; to the right are Roman soldiers preceding, and on the left the three Marys, and several of the disciples following. All these figures are in *alto-relievo*, appearing at first sight to be altogether detached from the background; but behind the effigy of the Saviour, a Roman centurion on horseback is delineated in *bas-relief*. The arcading is in the Decorated style, the capitals being supported on polished marble pillars. The cost of the reredos is about 600*l.*

PROVINCIAL NEWS.

Dudley.—At a private meeting of the Town Council in committee, the question of selecting a plan for the alterations in the Town-hall has been discussed. Mr. Stokes moved a resolution to the effect that Mr. Borradale's plans should be accepted. Mr. Sheppard moved, "That the Council be recommended to apply to builders for tenders or the proposed alterations, and in case the lowest tender did not much exceed the estimate of Mr. Borradale (2,000*l.*), his plans be adopted, and the matter placed in his hands as architect, at a commission stated; but if the tenders were much higher than the estimate, the whole affair to be left with the Council." Mr. Dudley seconded this amendment. Mr. Warmington moved, and Dr. Higgs seconded, as a further amendment, "That the matter be deferred a fortnight, and that in the meantime Mr. Borradale should satisfy the committee that the work could be done at an estimate." Three voted for Mr. Warmington's amendment, twelve for Mr. Sheppard's, and thirteen for the original motion.

Cambridge.—The new building for the Cambridge Young Men's Christian Association has been opened. The site is a central one, at the upper end of Falcon-yard, and has four public ways to it open on three sides, without any annoyance from carriage traffic. This site was purchased for 1,100*l.*; and on the 30th of March in last year the foundation-stone was laid. Mr. Loveday, of Tibworth and Cambridge, is the contractor; and Mr. Waterhouse the architect. The building has a corner situation, and is approached from St. Andrew's-street, by Post-office-terrace; from Petty Cury by Alexandra-street; from Downing-street, *viâ* the Corn Exchange, by St. Tibb's-row; and by the Falcon-yard. There is a double entrance from Alexandra-street and Tibb's-row to the entrance-hall; and on ascending a wide stone staircase (fitted with mahogany handrail and iron balusters), the visitor is ushered through double doors into the lecture-hall. This is about 50 ft. long, exclusive of the orchestra and gallery. The latter is 10 ft. deep, and the orchestra—in a semicircular form—runs back about 12 ft. more. The average width of the hall is 31 ft., the narrowest point being about 30 ft., and the broadest 37 ft. The lecture-hall is 22 ft. high, and is said to accommodate 400 people. The gasfittings are of Mr. Waterhouse's designing, and were manufactured at the Midland Architectural Works, Coventry. Communicating with the reading-room is the library, with an extensive array of shelves; and this leads to the secretary's room. Along the reading-room and the secretary's compartment runs an extensively glazed corridor, at the end of which is another entrance to the conversation-room. Descending another lot of stone steps, the basement is reached, to which entrance is gained from the south end of Tibb's-row. Here are lavatories and other conveniences. On the right and left of the passage in the basement are large class-rooms (20 ft. by 14 ft.), which are designed for the double object of allowing benefit societies to hold their meetings in, and keeping them away from the public-house. For quarterly meetings large societies would take the large hall. The flooring in the basement is of red and black Chesterton tiles. The whole of the basement is heated with hot water, and the upper compartments with hot air—both heated at one furnace. There are kitchen and other conveniences for supplying tea to any meeting held in the place. The total cost is nearly 5,000*l.*, and the building has been carried out under the superintendence of Mr. Tift, clerk of the works.

VARIORUM.

"SANITARY Science and the Sewage Question: a Lecture in King's College, London. By Lewis Angell, C.E. London: Spon." This lecture was addressed to the Department of the Applied Sciences in King's College in July last by Mr. Angell, the West Ham engineer and surveyor, who is an honorary fellow of King's College. It does not introduce theories, but simply presents a sort of epitome of established facts in both a popular and scientific form; its object in a published form being to circulate information and prevent the recurrence of past errors, to which end it is well adapted to be useful.——"Report of the Drainage of the Borough of Belfast; J. J. Montgomery, engineer; also Report on the Proposed Plan by J. W. Basalgette. Belfast:

Baird. 1867." Of date 24th of December, 1850, in a printed prefix, Messrs. Bazalgette & Montgomery say:—

"The accompanying general plan shows the scheme which we propose for the drainage of Belfast and the reclamation and sewage irrigation of the sea marshes of Belfast Lough. In republishing the following reports, it is necessary to state that the irrigation having been decided on, and the levels and other data having been more accurately determined, an improvement of the whole scheme will be effected by the modifications shown approximately on the plan. Other alterations have become necessary in consequence of the new buildings, docks, &c., but the scheme remains virtually as we had previously proposed. It is satisfactory to be able to state that further investigation confirms the opinion that the works will be very successful, not only as regards their efficiency in promoting the health and comfort of the inhabitants, but as regards their financial results. The profits from the irrigated lands will go a long way towards repaying the cost of the thorough drainage of Belfast."

——"Boston Harbour and Outfall, 11th October, 1870: Report of W. H. Wheeler, C.E., to the Boston Harbour Commissioners. Buck, Printer, Boston." This is a report on the scheme for improving the outfall of the River Wilham by fascine training works in the Scalp Reach. Mr. Malcolm, M.P., having written to the local commissioners in March last, strongly advising the scheme of their engineer and surveyor, Mr. Wheeler, to be carried out, the commissioners instructed their surveyor to prepare a report on his scheme, with plans, &c., showing the land proposed to be reclaimed, the course of the training work, and the estimated cost; and the report and plans now printed and before us have been accordingly prepared and circulated:—

"Shortly," says the report, "the scheme here proposed is to extend the fascine work a distance of about two miles below Hobhole, so as to confine the tidal and fresh waters to one channel, and to fix the shifting sands which now choke up the river; to dredge out the clay, so as to deepen the channel and make the bottom of a uniform level with the sill of Hobhole Sluice; to purchase the right of the Crown over the barren sands lying on each side of the channel.

The cost of carrying out this work is estimated at 21,000*l.*, the interest on which would be 682*l.* per annum. The principal to be repaid by the sale of the lands which the training will assist in reclaiming."

The benefit derived, according to Mr. Malcolm, will be the immediate lowering of the water in the upper portion of the river to the extent of 4 ft., a general improvement of the channel below Hobhole, and the formation of agricultural land from the shifting sands, which mainly contribute to the annual silting up of the river.——F. May's "London Press Directory and Advertiser's Handbook: a Classified Guide to the Metropolitan Press. 1871. London: May, King-street, St. James's." This seems to be a useful handbook. In the prefatory remarks it is stated that there are now issued 316 London newspapers. Of these, twenty-one are daily, one, oddly enough, five times, and one four times, a week, two three times a week, and thirteen twice a week. There are 215 weekly, and others fortnightly and three times a month, and forty-six monthly. Of London periodical publications, magazines, reviews, &c., there are 473, besides those enumerated under the head of newspapers. Of the former, 338 are monthly, seventy-six quarterly, thirteen irregularly, thirty-seven weekly; and others are bimonthly, half-yearly, and annually published.——Messrs. Groombridge's "Rainbow Stories" promise to be popular. We have the first two before us—"Phil Thorndyke's Adventures," by Frances Wilbraham, and "The Rift in the Rock," by Mrs. S. C. Hall. The latter is directed against jealousy in the child mind, and is a very interesting story charmingly told.——The *Rectangular Review* has some agreeable papers on Modern Portrait Painters, Modern Poets, and the Drama. It contains an overdose of very speculative Masonry.——"Historical Diary of the War between France and Germany," by H. Allnutt, part I., shows in small compass the remarkable events that followed each other up to the end of October. Other parts will follow.——Last year's volume of *The Sunday at Home*, and that of *The Leisure Hour*, now ready for delivery, are full of very interesting and safe reading, very fully illustrated.——*The People's Magazine* continues its account of the Mont Cenis Tunnel, and has a view of the Royal Library, Windsor Castle.

Miscellanea.

The Surveyorship of St. Saviour's.—The Local Board of Works for the district has unanimously voted an increase of 50*l.* per annum to the salary (200*l.*) of their surveyor, Mr. Greenstreet, "for the excellent way in which he has carried out his duties."

Notre Dame de Paris.—Mr. John Ruskin writes to a London paper:—"It may perhaps be interesting to some of your readers, in the present posture of affairs round Paris, to know, as far as I am able to tell them, the rank which the Church of Notre Dame holds among architectural and historical monuments. Nearly every great church in France has some merit special to itself: in other countries, one style is common to many districts; in France, nearly every province has its unique and precious monument. But of thirteenth-century Gothic,—the most perfect architectural style north of the Alps,—there is, both in historical interest and in accomplished perfectness of art, one unique monument,—the Sainte Chapelle of Paris. As examples of Gothic, ranging from the twelfth to the fourteenth century, the cathedrals of Chartres, Rouen, Amiens, Rheims, and Bourges form a kind of cinquefoil round Notre Dame of Paris, of which it is impossible to say which is the most precious petal; but any one of those leaves would be worth a complete rose of any other country's work except Italy's. Nothing else in art, on the surface of the round earth, could represent any one of them, if destroyed, or be named as of any equivalent value. Central among these, as in position, so in its school of sculpture; unequalled in that speciality but by the porch of the north transept of Rouen, and, in a somewhat later school, by the western porches of Bourges; absolutely unreplaceable as a pure and lovely source of art-instruction by any future energy or ingenuity, stands,—perhaps, this morning, I ought rather to write stood,—Notre Dame of Paris."

Moab and the Moabite Stone.—At a meeting of the Bath Literary and Philosophical Association, the Rev. Prebendary Scarth in the chair, the Rev. W. J. Odgers has read a paper on "Moab, the Moabites, and the recently-discovered Moabite Stone." After referring to what had been written in reference to the stone by M. Ganneau, Professor Rawlinson, Professor Weir, Professor Schlettman, Dr. Ginsburg, and others, Mr. Odgers brought together, from various sources, such facts as appeared most likely to interest the members of the Association, giving some account of the country in which the Moabite Stone had lain for about 2,500 years, and of the people who have inhabited that country during those long ages. The inscription on the Moabite Stone describes the various works accomplished by King Mesha, especially his building a bridge across the Arnon. The banks of this river are so steep, that the descent on the south side occupied Irby and Mangles an hour and half. Traces of a paved Roman road are still to be seen on both sides of the ravine, and there is still standing one arch of a bridge, 28 ft. 9 in. in height, and 31 ft. 6 in. span; and there seems little room to doubt, said Mr. Odgers, that this old Roman road and old bridge are on the basis of the ancient road and bridge constructed by Mesha, as recorded on the Moabite Stone. Other points of interest were noticed in the lecture (which occupied more than an hour in delivery). The lecture was illustrated by large maps, drawings, &c.

A Roman Cemetery.—An unexpected discovery has been made in the grounds of the Rev. C. P. Peach, at Appleton-le-street, on the line of Roman road from Malton and Isurium, and about half a mile from the extensive Roman floors found by the Rev. James Robertson a few years ago. In excavating for garden work, several human skulls and disturbed bones were found in the top soil, and lower down, in fine oolitic sands and gravels, undisturbed burials in good preservation were met with. These were of men, women, and children. They were all lying east and west, or nearly so, some on the back, with hands down, in the Christian fashion; others on one side, recumbent, with hands up to the face in two cases. There were some shards of Roman pottery, some animal bones (split), and a few burnt stones. The bank is doubtless full of interments.

Carlisle Bridge, Dublin.—At a meeting of the Royal Dublin Society on the 16th ult., Mr. Chas. Geoghegan, architect, read a paper on "A New Method of Extending Bridges and Reducing Steep Gradients," with especial reference to his design for improving Carlisle Bridge. He maintained that for 29,000*l.* it might be made a bridge 153 ft. wide, perfectly flat, economical, symmetrical, enduring, and architecturally superior to most of the modern flat bridges in Europe.

Rateable Value of Metropolis.—The following returns, showing the total annual value of the rateable property in the metropolis, was prepared by Mr. W. F. Jebb, clerk to the managers of the Metropolitan Asylum District, under the provisions of the Valuation of Property (Metropolis) Act, 1869:—St. Marylebone parish, 1,159,187*l.*; St. Pancras parish, 1,149,817*l.*; St. Mary, Lambeth, parish, 935,803*l.*; St. George's union, 1,862,398*l.*; St. Mary, Islington, parish, 984,041*l.*; St. Leonard, Shoreditch, parish, 451,611*l.* 10*s.*; St. Mary, Paddington, parish, 941,811*l.*; St. Matthew, Bethnal-green, parish, 270,524*l.* 5*s.*; St. Giles, Camberwell, parish, 478,118*l.*; St. Luke, Chelsea, parish, 341,749*l.*; Mary Abbott's, Kensington, parish, 935,720*l.*; St. George's-in-the-East parish, 184,175*l.*; Mile-end Old-town (hamlet of) parish, 268,499*l.*; St. John, Hampstead, parish, 263,915*l.*; St. Giles and St. George, Bloomsbury, parish, 307,392*l.*; Westminster union, 623,541*l.* 15*s.*; Whitechapel union, 314,850*l.*; Greenwich union, 421,537*l.*; Wandsworth and Clapham union, 695,023*l.*; Hackney union, 580,376*l.*; Holborn union, 726,022*l.*; Strand union, 553,706*l.* 1*s.*; Fulham union, 281,214*l.*; Stepney union, 256,687*l.* 10*s.*; Poplar union, 448,882*l.*; St. Saviour's union, 724,345*l.*; Lewisham union, 386,821*l.*; St. Olave's union, 579,596; City of London union, 2,556,404; Woolwich union, 216,306*l.* 10*s.*: — total, 19,900,072*l.* 11*s.*

Another House-Boiler Explosion in the North.—One of these alarming accidents has occurred at the residence of Mr. T. C. Temperley, Claremont-place, Gateshead. Some time ago Mr. Temperley determined to erect, in the rear of his house, an outshot building, the upper story of which should include a bath-room. To supply the bath a boiler was fitted up behind the kitchen fire-place, communicating with the new bath-room by means of pipes. The kitchen is on the basement story of the house, and is sunk about 8 ft. below the level of the street. The drawing-room is immediately above the kitchen; and the eastern gable, close against which the boiler was laid, is at present exposed, the ground immediately adjoining not having been built upon. The boiler was put in its place only about a month ago. So far as was known, it had been in good working order from the time it was brought into use, and no danger was apprehended, the water in the tap outside the house being "on," although a severe frost had been prevailing all night. The fires were lighted as usual in the morning, and nothing was supposed to be wrong until about one o'clock, when, without a moment's warning, the boiler exploded, with a terrific shock, wrecking everything in its way to pieces. The house was so shattered by the explosion as to be little better than a wreck.

Archæology in Rome.—An ancient tomb has just been discovered in one of the side towers of the Porta Salara, which is in course of demolition for the restoration and enlargement of that gate. The architect, Vespignani, who directs these works immediately informed General Lamarmora of the discovery. The tomb, says the Roman correspondent of the *Morning Post*, consists of a square monument of travertine stone, measuring about four metres on each side, with basement and pilasters in slight relief. It had been built up in the tower, on the right hand of the gate, on going out of the city. The British Archæological Society, according to the same authority, has resumed its meetings at the Poli Palace. The opening discourse was delivered on the 30th December, by Mr. J. H. Parker, "On the Excavations in Rome during the year 1870." On the 6th ult. Mr. C. J. Hemans gave a lecture upon the "Inundations in Rome." On the following Friday, the 13th ult., Mr. Parker delivered a lecture on "The Leonine City, from its foundation by Leo IV. to its present condition," followed by a rapid but learned epitome of the varied destinies of the Mausoleum of Adrian up to its present denomination of the Castle of St. Angelo. The Rev. Mr. Shadwell, on the 21st ult., read a dissertation of the Chevalier L. Visconti, upon the Colosseum, or Flavian Amphitheatre.

Ireland.—The new church and refectory buildings have been completed at the College of St. Stanislaus, Tullabeg, one of the most important educational establishments in this country. The recent additions measure 100 ft. by 36 ft., and have been completed under the direction of the architect, Mr. Charles Geoghegan.

Opening of a New Reservoir at Lakenham.—The Norwich Water Works Company have just completed an important work in connexion with the water supply of the city, in the building of a new reservoir at Lakenham. It was designed by Mr. Thomas Hawksley, C.E., of London, the engineer-in-chief to the company. In the first instance contracts were solicited, but it was ultimately determined that the company should itself undertake the work. The total cost has been 6,000*l.* or 7,000*l.* The company's manager, Mr. Ayris, had the charge of the undertaking, and Mr. W. H. Bishop acted under him as clerk of the works. The site adjoins that on which the old one stands, namely, near the church of St. Mark. Some 7,000 cubic yards of excavation had to be made. The reservoir, a covered one, is 128 ft. square inside, and 17 ft. from floor to roof. It is constructed on the principle of groined arches carried on independent piers, 64 in number, the outer walls, for strength, being made to form a series of bays, the roof of each bay terminating in a half-dome. A tank is formed at each corner, the outer walls of which are circular, with a domed roof, the whole constituting a corner tie in binding together the walls of the reservoir. The floor is made up of a bed of concrete, overlaid with a bed of clay, covered with bricks, the concrete being extended beyond the foundation of the outer walls to a puddle clay bank, which is carried up from it to above the water-line of the reservoir. The quantity of water which the reservoir will contain is about 1,400,000 gallons.

The Sanitary Measures of the Government.—Sir C. B. Adderley, M.P., writes as follows to his constituents:—"The work which has now occupied me two years, and during this recess has kept me much away from the country, namely, the chairmanship of the Royal Sanitary Commission, seems to be approaching a successful end. The report is forthcoming, which gives a history of our confused and multifarious sanitary laws up to the present time, and extensive evidence, oral and written, on the imperfect working of local government,—the most vital essence of our national vigour,—in most parts of the country. It elaborates, through comment and argument, a complete consolidation into one clear statute all the provisions which in every town and parish of England and Wales, except the metropolis, are required for the health and social well-being of the community. Mr. Bruce assures me that he and two of his colleagues are now hard at work preparing a Bill from these materials; and I hope that, while the better organisation of our national defences will be necessarily the main subject of the labours of the approaching session, this great work of domestic reform may find its quiet opportunity. The idea of the one comprehensive Act will be to render uniform, general, and active the powers of local government in every place, under the inspection and stimulus of a central authority."

Ditching by Steam.—The *Scientific Press* (American) gives the following sketch of a steam ditching-machine now on exhibition in San Francisco:—On a frame, 41 ft. long and 12 ft. wide, mounted on four wooden wheels, are placed a 23-horse power steam-engine, the cutting apparatus, and the belts for raising and discharging the earth. There are four revolving knives for pulverising the ground, 2 ft. in width, and having on each side a blade for turning the sloping edge of the ditch. These can be raised or lowered as desired. The earth is thrown upon a gutta-percha apron or belt, which elevates it to the rear of the machine, whence it is thrown off to the side of the ditch by a horizontal belt. The machine is claimed to be able to cut daily from one or two miles of a ditch, 4½ ft. deep, 4 ft. wide at the top, and 28 in. wide at the bottom, three workmen and an engineer being required to run it. The entire weight is about 8 tons.

Reformation of Funerals.—A Reformed Funerals Company, in Langham-place, speak of their improved system of conducting funerals, and "the new and superior hearses and carriages which have been built for the Company from novel and artistic designs, by Messrs. Corben & Sons, of Great Queen-street." The company will dispense with mutes, velvet horse-cloths, ostrich feathers, and all such mere theatrical display. Their capital is 10,000*l.*, in 2,000 shares of 5*l.* each, of which one-fifth (400 shares) have already been agreed to be subscribed. The Dean of Armagh is one of the directors.

"On Landscape." — Professor Ruskin is lecturing on Landscape in the theatre of the New Museum, Oxford. In his first discourse, as reported in the *Athenæum*, the lecturer thus sketched out a mode of operation:—"In beginning a subject, the first thing is to outline it with a definite terminal pencil-line; but note, previous to commencing your sketch, (1) The date and time of day; (2) the temperature and the direction and force of the wind; (3) the direction in which you are looking, and the side from which the light proceeds. As the outline of solid form represents natural limits, your pencil-lines should correspond exactly with these limits. In landscape, the outline is often so complex that it is impossible to imitate it; it is no outline, but only a softened edge. This tempts painters to neglect outline and think only of colour, thus losing their sense of organic form, their precision of hand, and their respect for every law and for all the safeguards and dignities of their art. Hence it is that landscape has become frivolous and justly despised. Turner is a great landscape-painter because he can really draw an outline. It is true that he often loses his outlines, but he can invariably find them again at his pleasure. The just law of landscape, then, is, that whenever one space of colour is distinguished from another by a clear limit, it must be marked by a plain and accurate outline. The outline should at first be equal throughout, though this may be modified afterwards. In some of Durer's best pictures the outlines are all of the same breadth; and yet he gets by means of them all the details of feature and expression.

Proposed Public Building and Market for Windsor.—We understand that Mr. Charsley is taking active measures to obtain this necessity for the town and neighbourhood. He has communicated with the Mechanics' Institute, the Local Government Board, the 5th Bucks Rifle Corps, the Building Society, the Gas Company, and the Water Company, to propose to build suitable rooms for holding their meetings, and for the accommodation of their officers, and also a fire-proof room in the basement for the safety of their books and documents, and an armoury for the rifle corps, on their promising to give fair rental for the accommodation. Satisfactory replies have already been given by some of the bodies, and the local *Express* says there is reason to believe that all will gladly avail themselves of this opportunity of having in one building accommodation for all the institutions of the place. This public building, if thus supplied, will have a large room capable of holding 500 persons. Mr. Charsley has promised to give the site, which will be in Mackenzie-street, near the railway station.

Water for the Mild Hindoo.—"A noted man among the Hindoos," writes the Calcutta correspondent of the *Times*, "has declared himself in favour of his countrymen using the ordinary water brought into the town by the municipality. This has been for some time a very serious question, and the declaration will be of value—in fact, will be a real sanitary victory. Hindoos cannot, the learned gentleman says, use any but the Ganges water for religious purposes; but for every-day use they are quite justified in taking the supply from the municipality, especially since no leather but only indiarubber is used about the pipes. There is little doubt but that this will decide the question. The great mass of the people only waited for some cue to do what every sensible person among them has wished to do if it could be done without breaking caste."

Society of Biblical Archæology.—This society has been formed. It has for "its objects the investigation of the archæology, history, and chronology of ancient and modern Assyria, Palestine, Egypt, Arabia, and other Biblical lands; the promotion of the study of the antiquities of those countries; and the preservation of a continuous record of discoveries, now, or hereafter to be, in progress." The secretary is Mr. W. R. Cooper, 9, Conduit-street.

Somerset County Lunatic Asylum Chapel.—We have received a letter complaining that Messrs. Parr & Strong, architects, who made the design for the chapel, have been employed to carry out the works themselves—and without the intervention of any building contractor. Farther, that the excess of the cost over the estimates is well-nigh incredible. We shall not be surprised to find that the matter is explainable.

Fires in the Metropolis in 1870.—From Captain Shaw's report on London fires, which has just been presented to the Board of Works, we learn that the total number of calls to fires, or supposed fires, received during the year 1870 was 2,188. The fires of the past year, compared with those of 1869, showed an increase of 374; and compared with the average of the last ten years, there was an increase of 555. The proportion of serious losses was, however, about the same as that of the last few years. The number of fires in which life was lost was twenty-one. 11,161,446 gallons, or about 50,000 tons, of water was the quantity of water used,—an insignificant quantity, the report states, for the work done. Captain Shaw presumes that London will not submit much longer to the inconvenience and risks of intermittent water supply, and anticipates that when constant high-pressure services have been established, the quantity of water used for extinguishing fires will be still further reduced, as in many cases a single gallon in an early stage is more effective than a million half an hour later.

Great Guns.—A correspondent writes,—People are talking of pebble powder and the great 35-ton gun which blows out a quantity of the 120 lb. charge unexploded. Now, sir, I presume it is desired to urge on the 700 lb. peacemakers quicker and farther with the same number of pebbles (David won a battle with only two). The great gun is fired by electricity, the swiftest thing known. My proposition is to place amidst the pebbles a number of long platinum wires, as fine as hair; the instant the electricity is transmitted, the platinum becomes red hot the entire length of every wire, and would give instantaneous ignition to every pebble. It may not be generally known that barristers' wigs of the more costly kind are made of fine platinum: it is preferred to horse-hair. If these legal ornaments (?) were touched with a conductor, you would in an instant see a red-hot-headed lawyer! It could be tested on some testy Q.C. in any of our law courts, and an explosion would doubtless take place.

Amalgamated Society of Engineers.—The annual *soirée* and ball of the Amalgamated Society of Engineers has taken place in St. George's Hall, Liverpool. There were upwards of 1,500 persons present. The chair was taken by Mr. N. Wade, president of the Liverpool branch of the society. Mr. James Samuelson and a number of other gentlemen were also on the platform. The society was established in 1851, and has now 322 branches, of which 288 are in the principal cities and towns of the United Kingdom, nine in Australia, four in Canada, one in Malta, one in Turkey, one in France, eighteen in the United States of America, and one in Bombay. In February, 1851, there were only 7,417 members, but in December last the number had reached 34,769. The following amounts have been expended in benefits during nineteen years:—Donation benefit, 485,824*l.*; sick benefit, 179,165*l.*; superannuation benefit, 53,327*l.*; accidents, &c., benefit, 17,600*l.*; funeral benefit, 55,850*l.*; benevolent grants, 14,877*l.*; assistance to other trades, 10,425*l.*: total, 817,068*l.*

Boards of Conciliation and Arbitration. At a meeting of the Social Science Association on the 30th ult., when Mr. Rupert Kettle read a paper "On Boards of Conciliation and Arbitration between Employers and Employed, and what is required to give them further Success," the following resolution was passed:—"That this meeting requests the Council of the Association to procure the insertion in any Bill before Parliament next Session clauses to secure, for modern boards of arbitration, formed to settle trade disputes, [the provisions of the Act of 5 George IV. c. 96, or to provide some other] means for enforcing the attendance of parties and witnesses, and the production of books, papers, and documents before such boards, and for the enforcement of awards duly made by them."

Mysterious Death of an Architect.—Mr W. Carter held an inquiry at the Red Lion Hotel, Barnes, respecting the death of Mr. John Cooper, an architect and surveyor, late of The Cedars, Putney, who disappeared from home under mysterious circumstances on the 7th December, and whose body was found in the Thames, near Barnes Bridge, on Monday last. The jury returned as their verdict that the deceased was found drowned, but there was no evidence to show how he came by his death.

Evaporation and Evaporation Gauges. A reprint from the proceedings of the Meteorological Society shows that Mr. George Dines, F.M.S., read an able and elaborate paper on this subject and on the formation of dew, in November last. At the close of the paper, Mr. Dines says:—

"I will briefly state my opinion as to the various causes upon which, *separately and combined*, evaporation depends.

First and greatest, is the movement of the air; this varies so much that the evaporation would in some cases be seven times as great as in others.

Secondly. Whatever tends to increase the temperature of the water, increases the evaporation; and any thing which lessens the temperature of the water lessens the evaporation.

Thirdly. Whatever tends to increase the temperature of the dew-point lessens the evaporation; and anything which lessens the temperature of the dew-point increases the evaporation."

It is curious, we may here remark, to note the way in which the surface of a pond, or other body of water, will occasionally, on some chilly misty morning, smoke as if it were a warm bath, and evaporate into the accumulating mist.

Victoria Philosophical Institute.—The third meeting of the session was held at 8, Adelphi-terrace on Monday last; several new members were announced. Mr. Savile's paper "On the Evidences of the Egyptian Monuments to the Sojourn of Israel," was read by Dr. Fraser. The Rev. J. H. Titcomb began the discussion by proving that several of the author's arguments were untenable, and he showed the concord that existed in numerous instances between the Scripture accounts, these discoveries on the Egyptian monuments, and the statements of Herodotus, Diodorus, and the Rabbinical Chronology of the fourth century. The Rev. C. Graham supported some of these arguments, as also did the Rev. Dunbar Heath. The chairman closed the discussion, and announced that the Rev. G. Henslow would read a paper on "Phyllotaxis, or the Arrangement of Leaves in accordance with Mathematical Laws," on the 20th inst.

Theatre Royal, Drury-lane.—The annual general assembly of proprietors of the Theatre Royal, Drury-lane, was held in the saloon of the theatre. From the financial statement it appeared that the total receipts, including the balance of 2,857*l.*, have been 10,880*l.*, and the payments, including the sum of 1,722*l.* to the Duke of Bedford for rent and 2,550*l.* to the trustees of the renters, had amounted to 8,346*l.*, leaving a balance of 2,534*l.* The receipts comprised the sum of 5,460*l.* received from the lessee. Mr. Marsh Nelson, the architect, read his report, which stated that, with the exception of some general repairs, the theatre was in a satisfactory condition. A long discussion ensued upon the disputes existing between the architect and the lessee, but ultimately the report was adopted. The chairman, in reply to a question, said the theatre was not insured.

Decorative Art.—Mr. E. J. Poynter, A.R.A., delivered a lecture on "Decorative Art," in the Lecture Theatre of the Royal Institution, Manchester, last week. There was a large attendance. Commencing by stating that truth is the essential element of all beauty in art, the lecturer proceeded to show that the qualities of mind required to produce a work of art were two—namely, the power of design and the power of imitation; the power of design being of two kinds, constructive and ornamental. Mr. Poynter led his audience from the consideration of a decorated coal-scuttle to that of the greatest works of the greatest of artists.

Another Somerset Sample.—At the last weekly meeting of the Bridgwater Board of Guardians Yeovil practices were illustrated and proved. The evil doings in unions are infectious, it would seem, in the western counties. A discussion ensued, and it was resolved that as Col. Ward, the Poor-law inspector, had already been invited to investigate a charge of insubordination against one of the hospital nurses, and an allegation against the matron of changing the linen of the hospital patients late at night, he should also be requested to investigate the present charges.

Cottage Hospital, Petersfield.—The project for establishing a Cottage Hospital for this town and the surrounding district, set on foot a little more than twelve months since, has been carried to a successful issue, the building being now quite completed. The hospital, which was designed by Mr. Hunt, of London, has been built by Mr. John Gammon, of this town.

Three Boys Suffocated in a Church.—Three boys, aged respectively 13, 8, and 5 years, sons of Jabez Lumb, were suffocated at All Saints' Church, Bradford, on Saturday night. They had gone into the vault containing the heating apparatus, and it is believed they had lain down to sleep. When they were found the place was full of vapour arising from the coke by which the fire was fed. Only one of the boys was alive, and he died shortly afterwards. The grandfather of the boys is verger at the church.

Yorkshire Architectural Society.—The general meeting of the Yorkshire Architectural Society has been held at the York School of Art. The Rev. Canon Hey presided. The Rev. G. Rowe, the secretary, read the report, which stated that the society continues in a flourishing condition. A paper on the Manor House at York, by Mr. Davies, was read; after which the Rev. T. Bayly read one on the Stained Glass of York Minster, and the Rev. G. Rowe one on Kirby Hill Church, Boroughbridge.

Junior United Service Club.—This club has been decorated by Messrs. Holland & Hannen, and Messrs. Holland & Son, under the direction of Mr. Moody, of South Kensington Museum.

TENDERS.

For alterations and additions to St. George's (Hanover-square) Union, Fulham-road, Chelsea:—

Turrell (Sloane-street)	£2,594 0 0
Henshaw	2,593 0 0
Newman & Mann	2,525 0 0
Nutt & Co.	2,493 0 0
Haylock	2,490 0 0
Hoare & Poolethwaite	2,430 0 0
Wood	2,385 0 0
Hill, Keddell, & Waldram	2,375 0 0
Till	2,375 0 0
Wigmore	2,350 0 0
Mann	2,345 0 0
Wright (Brothers) & Goodchild	2,345 0 0
Cook & Green	2,333 0 0
Snowden	2,333 0 0
Nightingale	2,332 0 0
Scrivener & White	2,294 0 0
Manley & Rogers	2,277 0 0
Carter	2,263 0 0
Thompson	2,234 0 0
Torkington	2,100 0 0
Stephenson	1,939 0 0
Turrell (Seymour-place)	1,845 0 0
Bradley	1,760 0 0

For house, in Whyteleaf-road, Caterham, Surrey, for Mr. G. H. Drew. Mr. Richard Martin, architect. Quantities supplied by Mr. F. Sparrow:—

Turner & Sons	£1,069 0 0
Jarrett	1,063 0 0
Langmead & Way	1,050 0 0
Ward	1,044 0 0
Smethurst	1,029 0 0

For main drainage works, for the district of New Shoreham, Sussex. Mr. J. P. Colbron, C.E.:—

Saunders & Loader	£6,750 0 0
Harries	5,759 0 0
Brown	5,500 0 0
Moore	5,199 0 0
Neave & Fry	4,730 0 0
Furniss	4,728 0 0
Goodair	4,685 0 0
Vickers & Crane	4,462 0 0
Blackmore & Howard	4,148 0 0
Cole	4,133 0 0
Hayward	3,735 0 0
Carter	3,610 0 0

For alterations and additions to the Old King John's Head, Mansfield-street, Kingsland. Mr. Edwards, architect:—

Foster	£427 0 0
Cole	425 0 0
Pringle	408 0 0
Cherry	399 0 0
Blackmore & Morley	393 0 0
Stead	385 0 0
Blott	372 0 0
Rooney, Brothers	371 8 0
Hart	360 14 8
Bennett & Sands	350 0 0
Chalk	345 0 0
Barton & Groves	340 0 0
Lumley & Co.	334 0 0
Howard	326 0 0
Crook	312 0 0
Maers (accepted)	283 0 0
Stevens	280 0 0

For house and shop, at Edmonton, for Mr. Dale. Messrs. Kennard & Buck, architects:—

Pocock	£1,460 0 0
Davies	1,400 0 0
Ward	1,360 0 0
Field	1,350 0 0
Wigg	1,295 0 0
Newton	1,295 0 0
Rist & Brown (accepted)	1,288 0 0

For finishing two carcasses, at Edmonton, for Mr. G. F. Janes. Messrs. Kennard & Buck, architects:—

Newton	£1,250 0 0
Lingell	1,193 0 0
Rist & Brown	1,000 0 0
Pocock	998 0 0
Davies	700 0 0
Brown (accepted)	662 10 0

For two cottages, at Edmonton, for Mr. J. Jackson Messrs. Kennard & Buck, architects:—

Newton (accepted)	£360 0 0

For alterations to Central Villa, Great Barford, Beds, for Mr. James Hart. Mr. F. T. Mercer, architect:—

Haywood	£105 0 0
Richards	95 0 0
Watford	74 10 0
G. Haynes	73 5 0
W. Haynes	72 13 9
Vickers	68 11 6
Knight & Boston (accepted)	64 19 0

For fittings, at 38, New Bridge-street, Blackfriars, for Messrs. Spiers & Pond. Quantities supplied by Messrs. Pain & Clark:—

		Deduct, if Honduras Mahogany.
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Cook & Green	575	55
Lascelles	556	56
Manley & Rogers	555	31
Drew	535	20
Bracher & Son (acced.)	499	50

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CHARLES LEWIS GRUNHEISEN, Secretary.
Offices, 33, Norfolk-street, Strand, London, W.C.
31st January, 1871.

MERTHYR TYDFIL LOCAL BOARD of HEALTH.—SEWAGE IRRIGATION.—WANTED, the SERVICES of a FOREMAN AGRICULTURAL LABOURER, who has had experience in Sewage Farming, to Superintend the Cultivation and Sowing of the Sewage Farms of this Board. Applications, stating age and wages required, with testimonials, to be delivered at my Office, on or before TUESDAY, the 21st inst.
THOMAS WILLIAMS, Clerk to the Board.
Merthyr Tydfil, 3rd February, 1871.

SURVEYOR of ROADS REQUIRED, for the New Romney Highway District, in the County of Kent; salary, 150l. per annum. He will be required to reside in the District, to enter into a bond with two sureties, to be approved by the Board, for the sum of 200l. and hold the appointment subject to one month's notice on either side. Candidates may, at their own expense, attend the Meeting of the Board, which will be held at the GUILDHALL, New Romney, on MONDAY, the 27th of FEBRUARY next, where the applications will be considered, but must send all testimonials with their application in writing to the Clerk on or before the 23rd FEBRUARY next.
HENRY STRINGER, Clerk to the Board.
New Romney, 28th January, 1871.

SCAGLIOLA MARBLE. — WANTED, first-class POLISHERS. None need apply unless they can execute the work in the very best manner, and are of good character and sober and industrious habits.—Address, X. Y. Office of "The Builder."

TIMBER TRADE.—WANTED, a JUNIOR CLERK.—Address, ALPHA, "Chronicle" Office, Gloucester.

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TO ARCHITECTS, SURVEYORS, AND BUILDERS.

WANTED, a SITUATION, by a good GENERAL CLERK, with either of the above. Aged 28. Neat draughtsman and book-keeper. Experienced quantity surveyor and estimator. Unexceptionable references.—Address, A. M. Mr. Macaulay's, Northallerton, Yorks.

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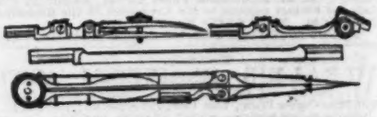

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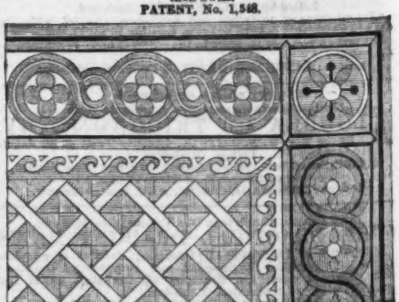

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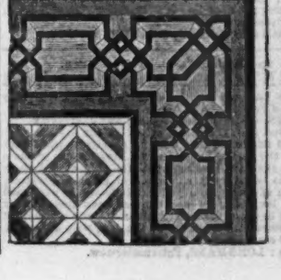

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